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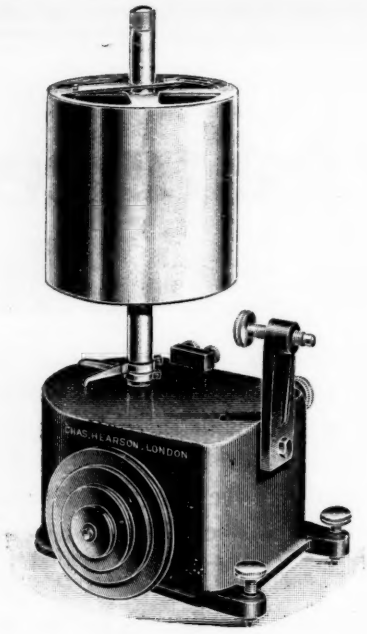

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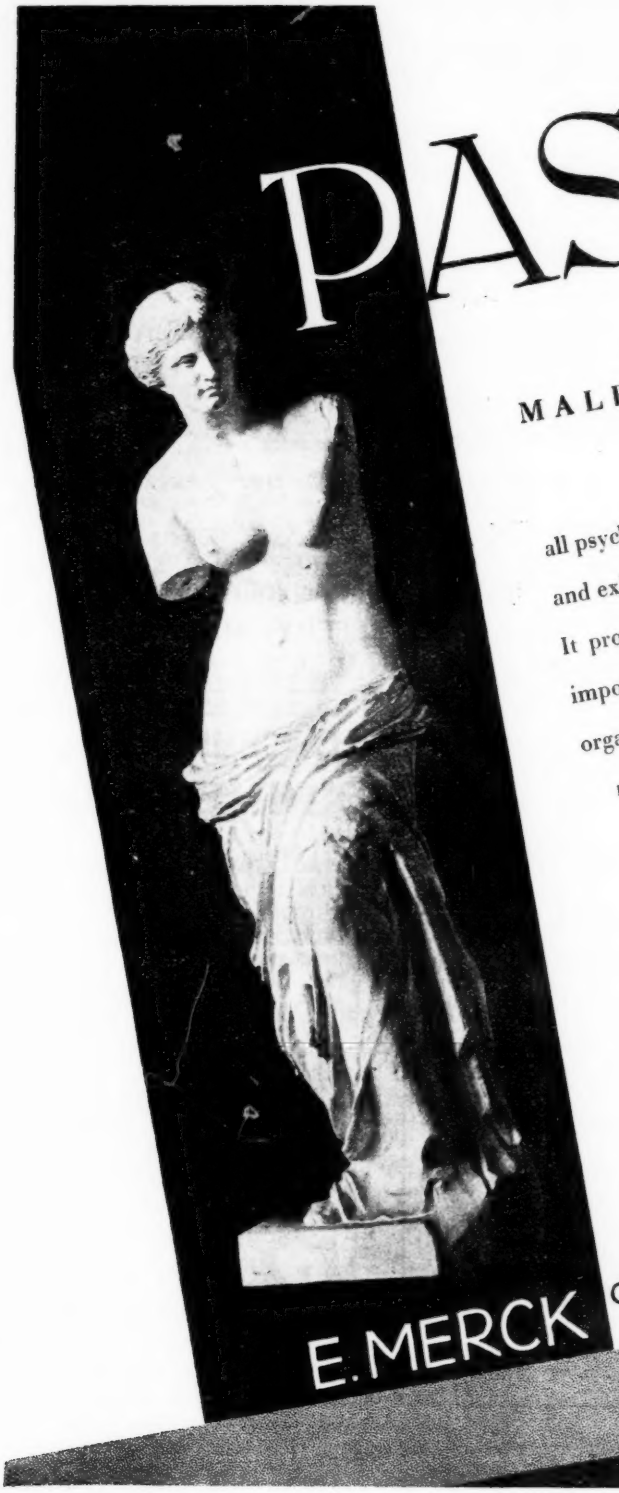

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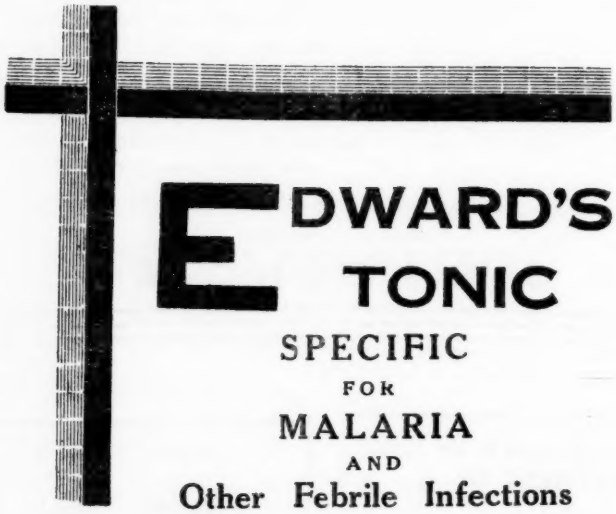

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JOURNAL
OF THE
INDIAN MEDICAL ASSOCIATION

Vol. III] *Calcutta : September, 1933.* [No. 1

Artificial Pneumothorax with special reference to the Treatment of Pulmonary Tuberculosis

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In writing this paper my sole object is to stimulate interest in the profession with regard to the treatment of pulmonary tuberculosis by artificial pneumothorax. It is now two decades or more since artificial pneumothorax has been tried with promising results universally all over the civilised countries and one of the physicians has justly remarked "No more hopeful ray of sun-shine has ever come to illumine the dark kingdom of disease than that introduced into the path of the consumptive through the discovery of artificial pneumothorax". Yet we have done very little to advance the progress of this encouraging treatment. To the best of my knowledge, it was not tried in a place like Bombay till 1925 when the matter was taken in hand by the late Dr. CONTRACTOR. Thanks to Major Prall for introducing this method in Poona and drawing our attention to it. Recently artificial pneumothorax has received a wider application but in this paper I shall restrict myself to its use in pulmonary tuberculosis only.

HISTORY

I will first narrate very briefly the history of A. P. JAMES CARSON of Liverpool, who first urged its trial and proved its feasibility by animal experiments in 1821. Eleven years later, JAMES HOUGHTON reported a case of a patient—a brick layer—suffering from advanced tuberculosis of lungs which showed such an improvement after spontaneous pneumothorax that he was thereafter able to work twelve hours a day. Nothing much was done till 1880 when this method received attention of POTAIN and his pupil. TOUSSAINT and POTAIN, actually treated a case of spontaneous hydro-pneumothorax by replacing fluid with air on repeated occassions. However, the credit of putting this method on a practical basis is due to FORLANINI, an Italian Physician, who did much to advance its progress and reported his cases treated with A. P. in 1894. SAUGMANN, one of the pioneers of pneumothorax treatment, made a very useful addition by inventing the manometer and thus prevented serious complications like air embolism which was of common occurrence before. Since 1905 or thereabout, this treatment received a favourable consideration in all the countries.

PRINCIPLE OF A. P. TREATMENT

From our knowledge of surgical tuberculosis, we know that if rest is given to the diseased part it results in healing and cure. We also know that elasticity and constant movement of the lungs interfere with the healing of tuberculous lesions in the lungs. Therefore if rest is given to the lung by collapsing it, it prevents spread of disease and allows Nature to effect a cure. This is the mechanical effect of A. P.

Its another effect is to produce lymph stasis which helps in the removal of toxaemia. In the opinion of some phthisiologists, the removal of toxaemia is the most important factor in pneumothorax therapy.

INDICATIONS

One would get best results where the disease is active and progressive in one lung only. Some hold that a case of this type should first be subjected to three months' routine treatment and artificial pneumothorax should be considered at the end of the three months when the routine treatment fails. There are many arguments against this view. Firstly, judging the conditions in the country, cases come under observation late or are not diagnosed early so that once the diagnosis is definitely established, even though the other side may be comparatively healthy one side is so much diseased that it is beyond the scope of any routine treatment. Secondly there is the difficulty of giving the correct routine treatment and keeping the patient under treatment for a sufficient time due either to economic conditions or otherwise. Thirdly, after three months' routine treatment if one decides to attempt A. P., one may find it difficult to perform on account of adhesions. It is impossible to fix any definite period when adhesions will be formed. I am, therefore, of opinion that when one meets with a case of active unilateral disease, the feasibility of inducing A. P., should be considered first rather than to wait and render the unilateral case unsuitable for A. P. on accunt of adhesions. The other indications in a unilateral case are (1) where the disease remains quiescent and there is incomplete response to treatment, (2) when there is severe and recurring haemoptysis, (3) when the associated toxaemia is pronounced, (4) when tuberculous laryngitis is present, (5) when there are cavities with copious sputum. As to indications in bilateral cases there seems to be a wrong view held that bilateral disease means a definite contra-indication, but it is not so. Of course one should not expect the same results as in a unilateral case. But much may be done in properly selected bilateral cases. When disease in the better lung is confined to the apex, upper lobe, or hilum, collapse of the worse lung may remove so much of the toxaemia and cause so great an improvement in the patients' general condition, that limited active lesions in the oposite lung have been found to improve. In forming a decision in these cases, one should rely more on the degree of the activity rather than on the amount of disease in the better lung. There should be at least two-thirds of the better lung free from the disease on physical and X-ray examination. While treating a bilateral case, one should carefully watch the better lung for any aggravation of disease.

A. P. AS A PALLIATIVE MEASURE

The question of A. P. treatment is a palliative measure in fairly advanced cases. No less authorities than SAUGMANN and CLIVE RIVIERE have treated quite hopeless and advanced cases with great improvement in the patient's condition. I will just quote the views of one of the authorities on pneumothorax—"Pneumothorax treatment may be claimed to differ very markedly from all other remedies used in the treatment of pulmonary tuberculosis. It is specially applicable to the treatment of advanced disease, when every other method for checking the progress of the process in the lung has been tried and found wanting ; when fever consumes the body and life is threatened with copious and troublesome pulmonary haemorrhage, this method of treatment, *i. e.* treatment by A. P. may be applied with striking success." Of course this does not mean that we should consider this treatment as last refuge of the dying. The object of inducing pneumothorax in these cases is just to give symptomatic relief and make the patient's life more comfortable and possibly prolonged. But as there is little or no chance of cure in these cases, the question is whether A. P. treatment would fall into disrepute if given in advanced cases. Another possibility is to increase the patient's discomfort in some cases. There is a good deal of truth

in these arguments. Every case, however, should be judged on its own merits and after explaining all facts to the relatives, if there is any hope of relieving symptoms, this method may be given a trial. I have so far tried in four fairly advanced bilateral cases, in three of whom I think I have definitely given symptomatic relief. Two of these patients are yet under my observation and it remains to be seen how long this improvement will be maintained. One patient after feeling slightly better ran away from the hospital. In the fourth patient cough was less and sputum diminished, but dyspnoea went on increasing and I had to stop treatment.

CONTRA-INDICATIONS

Amongst contra-indications to pneumothorax treatment the following may be mentioned: (1) advanced degree of emphysema, (2) advanced chronic bronchitis and asthma, (3) intestinal tuberculosis, (4) densely adherent pleura, (5) advanced bilateral disease, (6) after the age of 50 unless there are special indications. One should remember that diarrhoea may be due to toxaemia and not necessarily due to tuberculous intestine. BURRELL reports a case where A. P. was contra-indicated on account of diarrhoea with offensive stools thought to be due to tuberculous enteritis, yet the patient improved and diarrhoea and toxaemia disappeared on the occurrence of spontaneous pneumothorax.

INSTRUMENTS

There are many instruments in use for inducing pneumothorax. The one which is commonly used in the British Isles and which I have been using is Lillingston-Pearson's apparatus. I believe this to be the cheapest instrument on the market. It is quite simple and has given good service. As to the choice of gas, oxygen, nitrogen, carbon-dioxide, all have been in use but air is preferred because it is easily obtainable and approaches most nearly the alveolar air.

TECHNIQUE

A word about the technique. The operation of A. P. should not be lightly thought of and therefore all tubing, needles, towels etc. should be well sterilized. Unless the patient is very neurotic, it is not necessary to give a preliminary injection of morphine before the operation. Site selected for puncture is the 5th space in midaxillary or 6th space in the posterior axillary, because the intercostal spaces are wider here, this part is thinly covered with muscle tissue, adhesions are less likely to be present, and the lung excursion is greatest here. Patient lies on his side with the puncture site uppermost. The site is then anaesthetised with 2% novocain from the skin down to the pleura layer by layer. Thorough anaesthetization is a very important part of the procedure. It is also equally important that the patient does not move as otherwise there is risk of missing the space anaesthetised. The trocar and cannula for primary induction connected with the tubing of the apparatus is passed through the anaesthetised area down to the pleura. The trocar is then withdrawn and the blunt end of the cannula is gently pushed through the parietal pleura. When the cannula is free in the pleural cavity the manometer will show negative pressure with free and easy oscillations ranging on an average between —8 and—2. Having ascertained that one is in the pleural cavity, air is cautiously run in. Sudden rise of pressure indicates that the pleural cavity is loculated by adhesions. After running about 250 to 300 c.c. of air, which is the usual average quantity at primary induction, the closing pressure is noted, cannula withdrawn, and the puncture sealed with collodion. Immediately after the operation the patient should lie quietly in bed at least for two hours and avoid unnecessary cough to prevent surgical emphysema.

DIFFICULTIES

The path may not be so smooth as described above and not uncommonly the following difficulties are met with; (1) One may be certain that one has entered the pleural cavity and yet there

is complete absence of manometeric response. This indicates either a densely adherent pleura or blocking of the cannula. The latter possibility may be excluded by passing a blunt stillete. (2) The cannula has entered the pleural cavity as shown by the negative pressure but the oscillations immediately stop on account of obstruction of the end of the cannula with the visceral layer of pleura. (3) The needle may enter the lung parenchyma, cavity or a bronchus when only trifling manometeric fluctuations round the atmoshperic pressure occur. (4) The needle may perforate a vessel when small fluctuation occurs, but soon stops from clotting in the needle, or blood may be seen running up the glass tube acting as a window. (5) The needle may puncture the diaphragm and enter the abdominal cavity showing reversed fluctuations.

Refills

Success or failure of A. P. treatment depends on accurate spacing and giving the correct quantity of gas and herein lies the skill of giving pneumothorax treatment. There is no standard rule about the intervals and the amount of gas to be given. The golden rule is not to allow the lung to reexpand as treatment proceeds. Whether the lung expands or is kept collapsed is judged by signs and symptoms and radiography. It is, therefore, essential to make periodic X'ray examinations and to conduct the treatment under X'ray control. Taking an average case, about 250 to 300 c.c. should be given at the first induction and the first refill in 24 to 36 hours later and the subsequent refills at the end of 48 hrs., 3 days, 5 days and so on, the quantity of gas gradually increased if everything goes on well. By this method it is possible to bring about the satisfactory degree of collapse in about a fortnight. When once this is obtained greater skill is required to maintain this degree of collapse by correct pressure, amount of gas, and correct adjustment of interval. When a satisfactory degree of collapse is obtained, refills of about 600 to 800 c.c. will be required at the intervals of a fortnight and still later once in three weeks or once in a month, the patient in the meantime doing his daily routine work.

Physical Signs in Artificial Pneumothorax.

There is slight bulging of the affected side with increase in girth and widening of the intercostal spaces. Percussion is hyper-resonant, breath sounds are diminshed, they are rarely lost completely. Rales and crepitations over the diseased lung disappear. Vocal resonance and fremitus may remain the same or slightly diminished.

General Management

Rest durtng the initial stages of treatment, at least till the desired degree of collapse is obtained, is essential. When the general condition is bad, he should be kept in bed for a longer time. It is pleasing to see how a patient, bed-ridden before treatment was started, is up and able to move about—a result which no other treatment could have achieved in a shorter time. It must be remembered that along with A. P. treatment, the general routine treatment must be given. The A. P. treatment is only one form of treatment and has to be combined necessarily with some other treatment of the disease. Burrel attaches great importance to studying the mental state of the patient and maintaining his mental equilibrium.

Effects of A. P. Treatment

The immediate effect is generally an increase of cough, sputum, dyspnoea and in some cases increase of fever and malaise as a result of autoinoculation, but as the lung gets collapsed all these symptoms disappear. With the disappearance of all symptoms, patient passes into the next stage of "Clinical recovery" the second of the three stages described by Clive Riviere. In this stage patient is free from all symptoms but he is the subject of imperfectly healed tuberculosis. In this stage, therefore, he may be allowed to follow ordinary routine of life, but he should avoid exposure to chill and cold, should not engage himself in occupations involving heavy physical work and should lead, if

possible, a country life. From this stage he passes into the third stage of CLIVE RIVIERE known as the stage of "Anatomical recovery" which is characterised by the complete healing of all T. B. foci. Upon this stage depends the decision whether to stop or continue A. P. treatment. If the lung is allowed to expand before healing has occurred, the tuberculous process will again be set into activation, besides lung may become so firmly adherent to the chest wall that one may fail to bring about further collapse if desired. On the other hand if collapse is maintained for a longer time than necessary, some authorities maintain that the lung will fail to expand on account of fibrosis. Against this argument however, is the fact that FORLANINI and others were able to bring out expansion and complete restoration of function after years of callapse. Whatever the view, it is essential to know that complete anatomical recovery has taken place before one discontinues treatment and this is a complicated task to decide. Decision depends upon two factors. First is the time limit. The average duration of A. P. is 2½ to 3 years and if the patient is free from all symptoms, doing well, and at work all these months, then the lung should be allowed to expand gradually and his condition watched carefully. The second factor depends upon the return of symptoms as the lung expands. If during the process of reexpansion, there is rise of temperature, cough, expectoration, this means active disease is still present, anatomical recovery has not taken place and is an indication for further maintenance of collapse.

EFFECTS ON THE SURROUNDING ORGANS

(1) The mediastinum will be slightly displaced to the healthy side, but if the intrapleural pressure is high, it will cause a good deal of displacement and bulging of the mediastinum, giving rise to dyspnoea, tachycardia etc. This can be avoided by cautious use of pressure, air and X'ray control. (2) The lung under treatment diminishes in size and shrinks considerably lying against the mediastinum, its substance is airless and all diseased foci are transformed into scar tissue. The caseous areas get calcified and cavities obliterated. (3) The effect on the non-collapsed lung—this functioning lung alone has to carry on the whole burden of respiratory function and it is very surprising to find how the functioning lung, which in the majority of cases is the seat of some amount of disease and further its action is hampered at least to a certain extent by the inevitable displacement of the mediastinum, is not only able to cope with the work demanded of it but any adventitious sounds, heard before treatment, disappear. If there is gross displacement of the mediastinum, function of the good lung is interfered with. (4) There may be slight displacement of the heart but even with considrable displacement there does not seem to be any interference with its function. FORLANINI reports a case where the right border of the heart reached right axillary line and the left mid-axillary and yet there was no interference with the heart's action.

SELECTIVE AND BILATERAL COLLAPSE

I will just make a passing reference to selective collapse and bilateral A. P. By selective collapse is meant partial collapse where the diseased part alone is kept at rest leaving the healthy areas expanded. This is effected by injecting air in small quantities insufficient to produce general collapse and at suitable intervals. Some authorities have not been able to record any very striking results. Selective collapse is useful in bilateral cases where one has to induce bilateral pneumothorax. Bilateral pneumothorax should be considered when active disease appears in the nontreated lung and begins to spread, or when both lungs are affected from the first. It is induced simultaneously or alternately. When both lungs are collapsed at the same time, the collapse should necessarily be a partial one. Simultaneous collapse has not given very useful results. Where disease appears in the nontreated lung, the lung under treatment should be allowed to expand and then collapse of the other lung, *i. e.* the one recently affected, induced. When one sees a case of bilateral disease from the first and bilateral pneumothorax contemplated, it should

be conducted alternately on each lung. I have at present under treatment a boy aged 18 whose right side was affected when he first came under observation about a year ago. Major Prall, the Civil Surgeon, induced and maintained collapse of the right lung for about ten months. There was marked improvement the patient attending his daily routine, untill about two months ago there was slight rise of temperature in the evening and the boy did not appear to be well. Physical examination and X'ray examination showed affection of the left apex. Major Prall who was to go home on long leave very kindly referred the case to me and under his instructions I allowed right side to expand and induced collpase of the left lung. Now the right lung is completely expanded and the left almost collapsed and it is interesting to find that there is no evidence of disease in the right lung. The temperature is normal now, there is no cough, no sputum, and the boy is not only well but has gained seven pounds in weigth.

Complications

1. *Pleurisy with effusion*—This is the commonest complication occurring in 40 to 45% of the cases. Tearing or stretching of adhesions, rupture of the visceral layer of pleura, irritation of pleura by repeated punctures, small rupture of lung, over exertion, chill, are all said to lead to effusion. Burrel thinks that these effusions are tuberculous exudates caused by infection with tuberculous bacillis. In the presence of effusion air is absorbed slowly and lung remains collapsed for a longer time. Therefore refills are no longer required at shorter intervals. Another effect is to obliterate the pneumothorax cavity. In some cases pleural effusion does good to the patient, but when it goes on to pus formation prognosis is very grave. Effusion may start with malaise and fever and it may be possible to demonstrate such physical signs as shifting dulness, absence of vocal fremitus and breath sounds, coin sound, succussion splash etc., or in some cases effusion may be suspected by the sudden rise of pressure and the diagnosis confirmed by X'rays Treatment depends upon the decision to stop or continue pneumothorax treatment. If desired to stop, the fluid should be left alone and the condition of the patient watched to see that the effusion does not go on to pus formation. When treatment is to be continued, fluid should be aspirated and replaced by air,

2. *Pleural shock*—This occurs rarely in spite of all the necessary precautions about anaesthetising the skin and pleura. Symptoms which appear at the moment when the needle is entering or leaving the pleural space, are sudden pallor, loss of consciousness, cyanosis, pulse and respiration become irregular, pupils dilate, and clonic and tonic spasms appear. Treatment is to withdraw the needle at once, patient's head lowered, subcutaneous injection of 1/2 c.c. of 1 in 1000 solution of adrenalin, camphor-in-oil and other stimulants.

3. *Gas-embolism*—This occurs when air enters the pulmonary vein and the source of air is from the alveoli or the pneumothorax apparatus itself. It is difficult to distinguish this complication from the preceeding because the clinical picture is the same in both. This complicatian can be avoided if the following precautions are taken : (*a*) Never allow air to run in until it is certain that the needle is in the pleural cavity as judged by the "free, easy and regular" oscillations of the manometer. (*b*) Do not use sharp needle for primary induction as there is risk of damaging the lung. (*c*) Do not use any pressure by raising water bottle but let the air run in first under negative pressure. (*d*) Do not ask the patient to cough or to take deep breaths when regular and free manometeric oscillations are not obtained. Treatment is the same as that of pleural shock.

4. *Surgical emphysema*—This is a common but harmless complication. It follows if the patient coughs much after refill or if high intrapleural pressure is maintained.

5. *Rupture of visceral pleura*—This is a serious complication and when it occurs it converts A. P. into spontaneous pneumothorax. Symptoms are sudden and severe pain in the chest, dyspnoea, hectic temperature, and rapid appearance of pleural effusion which soon becomes purulent.

Treatment is to relieve dyspnoea by removing air from the pleural cavity and if necessary to wash the pleural cavity. If perforation remains, open thoracoplasty should be done.

6. *Displacement of the mediastinum*—Usually there is slight displacement of the mediastinum in artificial pneumothorax. Some patients appear to get on well even with gross mediastinal displacement. Usually the symptoms are dyspnoea and loss of weight due to impaired metabolism. Treatment is indicated only when the displacement causes symptoms and is carried out by carefully adjusting the intervals and the quantity of gas injected. If the mediastinum is very mobile, it should be rendered rigid by introducing gomenol into the pleural cavity.

7. *Puncture of the heart and of a large vessel* is reported but no untoward result followed.

8. *Pain*—I have already referred to the importance of thorough anaesthetization of the puncture site so as to render the operation painless. Pain during A. P. treatment varies from a feeling of slight discomfort to severe pain. In most of the cases it is just a slight feeling of discomfort. So far I have not met with a case where patient had severe pain. Pain may be due to various causes such as (*a*) stretching or tearing of adhesions, (*b*) surgical emphysema, (*c*) pleurisy, (*d*) filling of air under high intrapleural pressure, (*f*) rupture of lung. In a few cases patient is oversensitive and neurotic so much so that one may be required to stop the treatment. I had recently under may care a patient who since the time he had an attack of pleurisy was addicted to morphine habit. I induced A. P. on him and tried my best to assure him that his pain would entirely disappear, but on account of his nervousness I found it impossible to continue the treatment. In this particular case the patient had another dread that he will have to give up his morphine habit.

SUMMARY

(1) The rationale of A. P. treatment is to give rest to the diseased lung.

(2) A. P. treatment is only one form of treatment and it has necessarily to be combined with the other appropriate treatment.

(3) It gives promising results in active and progressive unilateral disease.

(4) Bilateral disease is not an absolute contra-indication but which may be done in properly selected bilateral cases.

(5) No fuss should be made about the operations.

(6) During the initial stages of treatment patient should be kept at rest in bed at any rate till the desired dgree of collapse is obtained.

(7) During treatment attention should be paid to the mental condition of the patient.

(8) Treatment should be conducted under the X'Ray control.

(9) Selective collapse should be considered when the disease is bilateral. Bilateral collapse, if contemplated, should be induced alternately and not simultaneously.

(10) Success or failure of A. P. treatment depends on the proper adjusment of intervals and the correct amount of air to be injected at each refill.

(11) Treatment has to be continued on an average for 2½ years.

(12) With proper care and technique, complications are few and rare.

In conclusion, I wish to express my thanks to Major S. R. PRALL and Rao Bahadur DR. N. H. KULKARNI, Radiologist, the Sassoon Hospitals, and the Staff at the Infirmary for the valuable help they have given me. I also thank the Secretaries, Indian Medical Association, Poona Branch, for giving me the opportunity to read this paper.

* A paper read before the monthly meeting of the Indian Medical Association, Poona Branch, on the 17th February, 1933.

On the Deterioration and Biological Assay of Tincture Digitalis in India

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TATE (1921) pointed out that tincture digitalis of standard strength deteriorates in a warm climate like that in India owing to heat and thus needs to be frequently tested. CHOPRA, BOSE and DEY (1925) observed that clinical trials as well as biological and chemical assays of tincture digitalis showed that it undergoes rapid deterioration in a tropical climate. WOKES (1929) carried out an extensive investigation on a series of tinctures from a week to 8 years old by both the cat and frog method and came to the conclusion that the agreement between the two methods was affected by the age of the tincture. In ten specimens of the tincture which had been made not for more than five weeks ago the difference between the two methods was within experimental error. In tinctures whose age varied from 8 weeks to 8 years the deviation between the two results varied more than 25%. WOKES concluded that in old tinctures frog-method gave lower results than the cat-method and hence a better method of detecting deterioration. WOKES (1930) made of further observations in London on tinctures prepared at intervals from thirteen different samples of digitalis leaves by assaying them on frogs using TREVAN'S method and came to the conclusion that there was a steady loss of activity in all the tinctures examined. During the first nine months this deterioration proceeded at an average rate of about 3% of the initial potency per month. After that time the rate of deterioration gradually decreased until about a third of the activity had disappeared at the end of sixteen or seventeen months. Tinctures with higher initial potency were found to be less. CHOPRA and DEY (1925) had observed earlier that some preparations which gave fairly high value by the cat-method were found to be useless on therapeutic trials. They suggested a modification of HATCHER and BRODY'S cat-method of standardising digitalis. This modification consisted in studying with stethescope at regular and frequent intervals the heart of the animal used for assay and carefully noting down any changes in the character, frequency and rhythm of the heart-beat. They, however, realised the disadvantages of their method and pointed out that clinical tests alone could give the most reliable information. But the clinicians would want to know beforehand the potency of the preparation they are going to use on their cases rather than to make use of the experience gained from one patient in treating the other. Besides this, no reliance could be made on one single or even two or three such observations particularly in the light of TREVAN'S work which showed that there was a very great degree of variation in animal experiments and before arriving at any fair estimate of potency one had to use large number of animals. TREVAN pointed out that the expression 'Minimum lethal dose" is never an accurate expression and that there is a wide gap between the dose which kills none and the dose which kills all of the animals when large groups are taken. His observations have been largely confirmed and the term "Minimum lethal dose" is fast disappearing from pharmacological language and is being replaced by the average or medium lethal dose which is the dose which kills 50% of the animals when large groups are used. Since then the older methods of biological assay which defined potency in terms of animal units such as frog or cat unit of digitalis, rabbit unit of insulin etc. are being replaced by methods in which potency is defined in terms of standard in which large number of animals are used. In these methods the results are calculated from an integrated frequency curve drawn from observations made on very large number of animals. Such curves have been worked out for different countries

such as TREVAN'S for England, GUNN'S for South Africa, BEHREN'S for Germany, and CHAPMAN'S for Canada.

The above brief review points out that tincture digitalis does deteriorate by storage both in England as well as in India but perhaps at different rates and that the cat-method is not a suitable method of detecting this deterioration. WOKES pointed out that the results obtained with frogs were more near truth. Inspite of there being some literature on this subject, good many people in India are still under the impression that tincture digitalis maintains its activity for at least a year in India. In view of this the following investigation was started with these objects in view : (A)

(*i*) To produce evidence of rapid deterioration of tincture digitalis in India and to obtain an idea of the average rate at which such deterioration progressed.

(*ii*) To find out a substitute for the frog-method of digitalis standardisation, as the species of frogs vary good deal in different parts of India and secondly as they are not available at all times of the year particularly in all provinces and thirdly because so far there is no integrated frequency curve worked out for India.

(*iii*) To have an idea of the potency of samples of tincture digitalis as are available in the Lucknow market.

Experimental methods. Tinctures were assayed either by the frog-method or the pigeon method.

Frog-method. Rana tigriana weighing between 30 to 60 G. were used. They were obtained fresh for each test and were not stored for any length of time in the laboratory. After drying and emptying their bladder they were carefully weighed and pairs of equal weight were placed underneath each glass jar. Six such jars were placed in each row in a part of the laboratory which was uniformly lighted. Tinctures were diluted with 0·6% saline and injected in doses of 1 c.c. per 100 G. weight. Injections were made with a tuberculin syringe graduated in 0·01 c.c. into the ventral lymph sac through the thigh muscles at about 2 p. m. and the mortalities were counted next morning at 10 a. m. that is after a lapse of 20 hours. On the first day, twelve frogs were injected with the standard and twelve with the test. On the next day, this was repeated on thirteen more frogs. So in all 25 received standards and 25 tests, and every time an unknown tincture was assayed. Calculations were made from the mortality percentage by using the potency chart given in 1932 British Pharmacopœia.

Pigeon-method. HANZLIK (1929) described a simple method of assaying tincture digitalis on pigeons in which injections of diluted tincture are made in the wing vein and the pigeon is watched from ten to fifteen minutes to see whether it vomits. He described the minimum emetic dose as the just effective dose which produced emesis in two out of three pigeons and suggested that the potency of digitalis preparations may be expressed in pigeon units. Such a test in view of TREVAN'S work on animal variation did not seem to be a very accurate procedure and further investigations on this test were carried out by BURN. He suggested that if pigeons are used in the same manner as frogs that is 25 pigeons are injected with standards and 25 with test and calculations are made from characteristic curve, then the pigeon method gives results resembling closely those obtained by the cat or frog-method. In this investigation BURN'S method was invariably used. Each bird was carefully weighed before injection and the volume injected was adjusted according to the body weight, 0·1 c.c. of the diluted tincture being used per 100 G. weight. Dilutions were made either 1 to 4 or 1 to 3 or intermediately. Birds used were between 200 to 300 G. in weight. The small feathers covering the wing vein were plucked and the bird was helped by an assistant while the injection was made. Provided that a sharp and thin needle was used no difficulty was experienced in making the injection. The bird was then placed in an empty cage and observed for 10 to 20 minutes. Three birds of different colour were placed in each cage to facilitate counting the number, which had vomited. No

difficulty was ever experienced in deciding whether or not vomiting had occurred as the movements were well characteristic. In most of the experiments fresh pigeons were used but when a bird was injected twice, an interval of four or five days was allowed to lapse.

Standard. Standard used was a freshly prepared tincture (never more than a month old) from the British Standard leaf made by the method laid down in 1932 B. P. and the strength adjusted to the international standard.

Results. The experimental results are given in tables I, II, and III. *Table I* gives the comparative figures of the assay of three samples of tincture digitalis by the frog and pigeon methods. These figures are within the experimental error, in fact those for tincture R are so near each other as are seldom obtained in experimental work. Burn obtained similar results with tincutres of high potency but his figures for weak tinctures were further apart from each other. This difference might be due to the fact that the Indian frog Rana tigriana behaves differently to Rana temporaria, the English frog. However it was quite evident from these results that the pigeon method of digitalis assay, was capable of fairly accurate results, provided a large number of birds were used and results were calculated from an integrated frequency curve, as has been described by Burn (1930).

Table I. Comparative figures of assay of three samples of tincture digitalis brought from London, by the frog and pigeon method.

Method	International standard Tinctures	Tincture R	Tincture C	Tincture P
Frog-Rana tigriana weighing 30-60 gm. 25, on standard compared with 25 on test. — —	100	76·4%	80·3%	497%
Pigeons 200-300 gm. in weight, 25 on standard compared with 25 on test. —	100	76·0%	68·8%	543%

Table II gives the result of assaying four samples of tincture digitalis at an interval of 6 to 12 weeks, three by the frog method and one by pigeon method. It is abundantly clear from these figures that samples of tincture digitalis undergo, rapid deterioration, when stored under ordinary conditions at Lucknow. The rate of deterioration during the months of September, October, and November, when the maximum Lucknow temperature was between 80-100, was about 10% per month, for tinctures of potency near about the standard and 12-15% per month, for tinctures of higher potency. Tr. S. which was assayed by the pigeon method on 28-X-33 and then again on 14-12-32, showed a deterioration of 11% in six weeks or 7·3% per month. During this period maximum Lucknow temperature was between 75-80. It was thus learnt that the pigeon method, like the frog method, was capable of detecting deterioration in samples of digitalis. Further figures for month to month deterioration are being collected and would form the subject of a further communication. TATE in (1921) and later CHOPRA, BOSE and DEY (1925) had pointed out that tincture digitalis deteriorates in tropical climate, but they gave no figures of the extent or rate at which such deterioration progressed. It is with the object of filling this gap in our knowledge that these month to month observations are being carried out. But even the preliminary results obtained so far are enough to show that tincture digitalis expected to maintain its full activity for a year is soon much below its original potency. In the light of these findings, it was thought that it would be of some interest and utility to know the potency of an average sample of tincture digitalis obtainable in Lucknow. For this purpose five samples were obtained from Lucknow Chemists in the ordinary way and assayed by the pigeon method. The results obtained are given in table III.

Table 2. Loss of activity, revealed by four samples of tincture digitalis,—3 brought from London and one prepared in the Laboratory from British Standard Leaf.

Tinctures	Method of assay	Original potency	Potency after storage	Interval	Percentage of deterioration per month.
Tr. R	Frog	97%	76·6%	2 months	10·2%
Tr. C	Frog	120%	80·3%	2¼ „	14·6%
Tr. P	Frog	80·1%	49·7%	2¼ „	16·9%
Tr. S	Pigeon	100%	89%	1½ „	7·3%

Table 3. Potency of 5 samples of tincture digitalis obtained from Lucknow Chemists.

Tincture	Colour	Mathod of assay	Potency after storage
Tr. I	Dark Brown	Frog	64·5%
Tr. L	Dark Green	Pigeon	42·0%
Tr. B	Dark Brown	Pigeon	66 6%
Tr. G	Dark Green	Pigeon	53·3%
Tr. S	Dark Brown	Pigeon	63·5%

A mere glance at this table shows that every one of these samples was much below the international standard and had their potency ranging only between 42%—66·6%. Under these circumstances an average heart case in Lucknow was receiving only half the amount of digitalis of what his doctor prescribed. This knowledge would be found useful by clinicians for it would enable them to use the drug in proportionately bigger doses and thus get the full therapeutic effect in much shorter time than they would, when using about with 5-10 minim doses of a 50% sample. This rapid deterioration of such potent and useful drug as digitalis, raises the important question as to what measures would enable one, to maintain its stability in the hot climate of India. To get over this difficulty some foreign manufacturers have put on the Indian market, tincture digitalis in about 150% strength but it has been my experience as well as of WOKES, that tinctures of high potency deteriorate still more rapidly ; so one of about 150% potency would be only about 50% at the end of 6-9 months which is by no means an unusual period for storage by chemists. Other foreign manufacturers have put on the market what they claim to be some stable glucosides obtained from digitalis lenta. I had so far no opportunity to test the therapeutic efficiency or the claims of stability of such products. Till such time that we are able to provide for our patients tincture digitalis in some more stable form, it should be our aim to see that tincture digitalis sold to our patients is of the standrad strength. The only way in which this can be ensured is in my opinion that big chemists and big hospitals should prepare their own tinctures from standardised leaf powder obtained in sealed glass ampoules at frequent intervals. It is well known that digitalis leaf powder, in vacuum sealed ampoules does not undergo any deterioration. The method of making tincture is quite simple and can be undertaken by any responsible man. Thus only we shall be able to ensure for our cases fresh supplies of tincture digitalis.

SUMMARY

1. Four samples of tincture digitalis assayed at different intervals revealed rapid deterioration, when stored under ordinary conditions at Lucknow.

2. The rate of deterioration during the three months of September, October and November progressed at the rate of approximately 10% per month for Tinctures of standard strength. Tinctures of higher potency were still less stable.

3. BURN'S modification of H'ANZLIK'S method of digitalis assay by pigeon emesis was found effective in detecting deterioration in samples of tincture digitalis.

4. Potency of samples of digitalis obtained from Lucknow chemists was very low ranging between 42% and 66.6% of the international standard.

5. In the light of these findings, suggestion is made that tincture digitalis should be prepared locally at frequent intervals. That big chemists and big hospitals, should obtain, standardised leaf powder in sealed glass ampoules and make their own tinctures.

I feel greatly indebted to DR J. H. BURN, Director of the Pharmacological Laboratory of the Pharmaceutical Society of Great Britain, London, for showing me the technique of pigeon emesis method and also for lending me some specimens of Tr. digitalis, which were sent to his laboratory for assay. I also wish to express my thanks to DR. S. LAL for his assistance.

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Adrenalectomy in Rabbits

By Dr. R. K. PAL, D. Sc., M.B., M.R.C.P. (Edin) and Mr. H. N. BANERJEA, B.Sc.,

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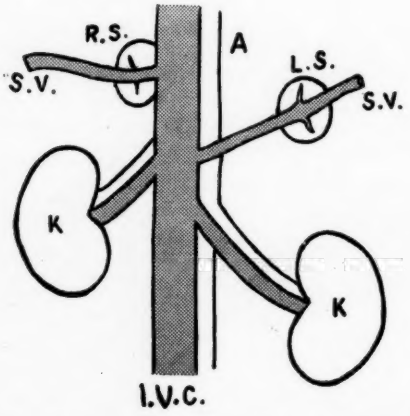
Suprarenal cortex is supposed to be essential for life and if both the glands are removed or even too much cortical tissue is damaged death takes place in a day or two (1). But experiments in our hands have thrown some doubts to the above hitherto well-recognised facts.

Bilateral adrenalectomy was performed in eight rabbits in two sittings, under chloroform anaesthesia, at an interval of one week.

Method of operation :

The suprarenal glands in rabbits which lie at some distance from the kidneys were reached from the back by an incision about an inch and a half long beginning from the last rib, about one inch from the spine. The thick fascia over the muscles was divided and the abdominal muscles were separated from the spinal muscles. On clearing the fat, on the left side suprarenal vein came into sight with the left suprarenal gland attached to it by some small branches, forming a sort of short hilum. A silk ligature was tied round it tightly and holding the gland by a pair of small gland forceps, it was removed entirely.

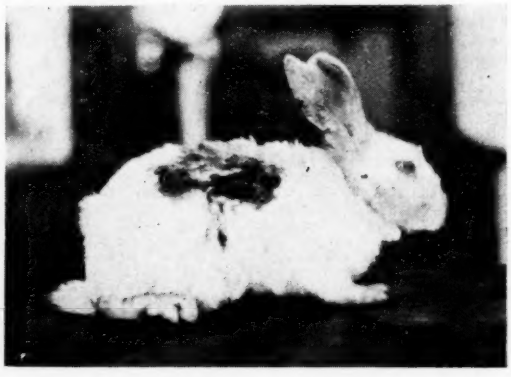


Diagrammatic sketch of the position of suprarenals in rabbits. RS-Right suprarenal, L.S.-left suprarenal, S.V.-suprarenal vein A.-aorta. I.V.C.-Inferior vena cava. K-kidney.

On the right side, through a similar incision, the gland which is situated at the junction of the right suprarenal vein and inferior vena cava, was reached. By careful dissection it was separated from the inferior vena cava and a tight silk ligature was put around the short hilum of the gland formed by very small branches of the right suprarenal veins. The separated muscles were sutured by cut-gut and the skin by silkworm gut.

In all the cases the wounds healed by the first intention in a week's time.

Of the eight animals, only one died six days after left adrenalectomy, four died on the night of the second operation, and three survived quite all right after bilateral adrenalectomy. One of the last three surviving animals died two days after the second operation, the second one, six days after, while the third one lived for more than a fortnight after the operation. Curiously enough, the last mentioned animal was subjected to an operation of splenectomy a fortnight before the suprarenal glands were taken out. Symptoms



A rabbit that lived for 15 days after bilateral adrenalectomy preceded by splenctomy.. Showing mark of incision on right side.

that preceded death of these bilaterally adrenalectomized animals were, weakness, incoordination and fall of body temperature.

VINCENT and THOMPSON [2] are of opinion that death due to respiratory failure in decerebrate double adrenalectomized animals can be prevented and life prolonged for several hours only, by repeated injections of saline extract of the cortex. So also STEWART and his co-worker [3] showed the influence of the adrenal cortex on the survival period of adrenalectomized cats and dogs. But in none of the surviving animals, after double adrenalectomy, snprarenal cortical extract was administered in any form whatsoever, still the animals lived for some days at least.

CONCLUSION

Removal of both the suprarenal glands does not always cause death immediately or soon after operation. So it is doubtful whether suprarenal cortex is essential for life and substance "*pneumin*" present in the cortical tissue of suprarenal glands, as suggested by VINCENT and THOMPSON, has probably nothing to do with the death of these animals later on, as there was no indication of respiratory failure before death. LASCANS-GONZALER'S experiments [4], that some of the toads can be made to live till 54th day after adrenalectomy, corroborate the above findings.

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Typhoid Bacteriophage

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In recent years, great advances have been made in the treatment of acute bacillary dysentery and cholera, and many workers are still engaged in laborious research works on them. But the problem of typhoid fever in our country, where in some places it is prevalent in endemic form and carrying away thousands in the prime of their lives is none the less important.

When we were college students, our Prefessor taught us "Every case of continued fever in the tropics should be treated as enteric, because 80% of cases of continued fever lasting for 3 weeks proved to be typhoid fever" and that treatment mainly consisted of alkaline mixture, intestinal antiseptics and water *ad libitum*. But as years rolled on, the field of our scientific knowledge has widened and new lights have been thrown on the solution of many of the difficult problems which were so long shrouded in dark clouds.

Thanks to the marvellous researches of Professor D'HERELLE, the specific treatment of some of the most dreadful diseases has been placed on a scientific basis. His researches have resulted in the discovery of specific ultramicroscopic living being, which when added to the susceptible bacterium, causes destruction and lysis of the organism concerned. D'HERELLE makes the widest claim for this agent as a natural therapeutic substance in the cure of disease and as a valuable therapeutic weapon in the armamentarium of the physician.

D'HERELLE'S contention was that in the intestine of every individual, there is present normally only one bacteriophage, which lives in symbiosis with B. Coli and other inhabitants of the normal intestine and when a foreign organism invades the intestine, the bacteriophage already present by virtue of its peculiar power of adaptability becomes parasitic to that bacterium and causes destruction and lysis of the

organism. But this theory of D'HERELLE cannot be held tenable because ASHESHOV and other workers have isolated several types of a particular race of bacteriophage. ASHESHOV has further been able even to differentiate subtypes of a particular type, thereby showing the specific nature of bacteriophage. Moreover the possibility of preparing a specific antiserum having specific neutralising effect for the given strain of bacteriophage goes in favour of the specificity of bacteriophage. Bacteriophage is present every where, in the excreta of patient convalescent from typhoid, cholera, bacillary dysentery, and in river water, tank water, sewage, in air, in other words it is omnipresent.

When we began this line of work, our attention was mainly directed towards dysentery and cholera bacteriophage, but owing to constant pressure from our friends we took the work of typhoid bacteriophage in our own humble way.

We were able to isolate a number of strains of typhoid bacteriophage within a short time. A few only were isolated from the stools of patients convalescent from typhoid fever. But the main source from which we have been able to isolate a good number of strain is sewage. In a number of cases of typhoid fever which came to our laboratory for Widal examinations, we tried to isolate the bacteriophage from blood, but hitherto we have been unsuccessful.

Though in the treatment of acute bacillary dysentery with dysentery bacteriophage, the result was quite satisfactory and encouraging, we were in doubt whether typhoid bacteriophage will be as efficacious as dysentery because typhoid fever unlike dysentery is not a purely intestinal infection. In dysentery it can be easily understood how, when all the pathogenic bacteria of the intestinal mucosa, in proximity to the bacteriophage, have been destroyed, the disease ends abruptly. But in typhoid fever it must be remembered that there is in addition a septicaemia and even though the destruction of the bacilli contained in the intestinal canal may be sufficient to delay the appearance of the disease or to restrain it from the beginning, it may not be adequate to overcome the infection when the disease has progressed and the pathogenic bacteria have spread throughout the body.

Whether typhoid bacteriophage has got any curative value in typhoid fever and whether becteriophage when introduced into the circulation can grow or multiply are matters that require careful investigation. For these several experiments on rabbits have been made in our laboratory. The following protocol will illustrate the experiments :

Group I.—Three rabbits were taken and each of them was given 2 c.c. of 200 million per c.c. living typhoid emulsion intravenously. All the animals became sick and all died within 12 to 15 hours.

Group II.—Three rabbits were taken and each of them was given 2 c.c. of 200 million per c.c. living typhoid emulsion and ½ c.c. virulent typhoid bacteriophage intravenously. Blood was drawn by heart puncture after 6 hours, 24 hours and 48 hours and was tested for the presence of typhoid bacteriophage. Only in the sample that was drawn after 6 hours presence of bacteriophage could be detected. All the animals were quite healthy.

Group III.—Three rabbits were taken and all of them were given virulent typhoid bacteriophage intravenously. The blood and the stool were examined for the presence of typhoid bacteriophage. The sample of blood that was drawn after 6 hours and the stools were found to contain typhoid bacteriophage but in other samples, that were drawn after 24 and 48 hours, no bacteriophage was detected.

Group IV.—Three rabbits were taken and each of them was given 2 c.c. of living typhoid emulsion, 200 millions per c.c. intravenously and ½ c.c. virulent typhoid bacteriophage subcutaneously. All of them became sick. The next day ½ c.c. of typhoid bacteriophage was given subcutaneously to each of them but there was no improvement in their condition. So on the third day ½ c.c. typhoid bacteriophage was again given subcutaneously to each of them. But on the fourth morning all of them were found dead. In order to test the presence of typhoid bacteriophage, heart of each of the rabbits was opened

and blood clots were taken and also the intestinal contents. Presence of typhoid bacteriophage could be detected in all the samples.

If we carefully study the results of these experiments, it will be seen that in Group II in which 2 c.c. living typhoid emulsion and ½ c.c. highly virulent typhoid bacteriophage were given intravenously, immediately after mixing the two, that is without giving any time for lysis to take place in vitro, all the animals lived. That bacteriophage could not be detected in the samples of blood drawn by heart puncture except the one that was drawn after 6 hours but was present in the stool is a proof that when given intravenously it was rapidly eliminated through the stools and possibly through other excretions also, and so long bacteriophage remained in blood it offered some resistance against the pathogenic bacteria. But it might be argued that the short time that passed between the mixing up of bacteriophage and bacteria and the injection given to animals, made the bacteria innocuous due to its contact with the bacteriophage and perhaps no living bacterium was introduced into the circulation. Though the animals belonging to Group I died within a few hours after inoculation, all the animals of Group IV resisted up to 3 days. In Group IV, the condition is the same as exactly what takes place in typhoid fever. That typhoid bacteriophage could be detected in the blood clots after the animals were dead, showed that some struggle between bacteria and bacteriophage took place and bacteriophage multiplied otherwise it would have been eliminated as what happened with the animals of Group II and III and could not have been detected in the blood.

Whether bacteriophage when given per mouth is absorbed from the intestine and passes into the circulation is too difficult a problem to give any definite opinion. In the treatment of 11 cases of typhoid fever with typhoid bacteriophage that came under our observation, 9 cases improved but no improvement was noticed in 2 cases within 48 hours. We could not carry on with our bacteriophage treatment in the latter two cases owing to unwillingness of patient's relatives to solely depend on bacteriophage as all other medication had to be stopped. We noticed in the cases that improved after oral administration of typhoid bacteriophage, there was definite improvement in the condition of the patient within 48 hours and the temperature gradually came down to normal.

Typhoid fever is not merely a local infection but there is in addition a profound septicaemic condition and if bacteriophage has not been absorbed how it was possible to exert its specific action on the bacteria present in the circulation, resulting in the subsequent dropping down of the temperature to normal level. We made an experiment by giving both bacteriophage and bacteria plus bacteriophage per mouth to different rabbits but we were not able to isolate the bacteriophage from heart's blood. In our experiment, there seems to be a big fallacy because in those animals that were given bacteriophage per mouth, the condition of the intestine was not suitable for ready absorption and the bacteriophage quickly passed through the intestine. But in a patient suffering from typhoid there are lesions in the Peyer's patches and lymph follicles of the intestine and bacteriae are present in the intestinal canal so when bacteriophage is administered per mouth it comes in contact with living bacteria, and begins to multiply and the condition of the intestine being suitable for absorption, the bacteriophage gets into the circulation.

D'HERELLE and KABESHMIA made a series of experiments on rabbits to determine the prophylactic value of dysentery bacteriophage after subcutaneous injection. TOPLEY, WILSON and LEWIS have also experimentally investigated the question of immunity and they have all agreed that a satisfactory degree of immunity is developed after 6 days even against bacillus typhosus and remains potent up to 3 months. So during a period of epidemic the best method to ensure prophylaxis against typhoid fever would be to give a single subcutaneous injection of typhoid bacteriophage and also daily administration of one dose on empty stomach for at least seven days.

Our experiments were directed to investigate the curative value of typhoid bacteriophage in typhoid fever. All the rabbits that were given living typhoid emulsion intravenously and typhoid bacteriophage subcutaneously, resisted for 3 days whereas, all the rabbits that were given living typhoid emulsion alone intravenously died within 12 to 15 hours.

Thus conclusion may easily be drawn that typhid bacteriophage can be used both for prophylaxis and for cure. In all cases of typhoid fever, a single subcutaneous dose of 1 c. c. of typhoid bacteriophage followed by oral administration of 6 doses within 24 hours on empty stomach may be able to cure a large majority of cases provided no antiseptic treatment is undertaken. In the absence of a specific intestinal antiseptic for a case of typhoid, the profession can easily fall back upon the typhoid bacteriophage which has got a demonstrable lytic action upon bacillus typhosus and is an absolutely harmless remedy to depend upon. The advantage of giving a subcutaneous injection of typhoid bacteriophage is twofold, firstly to get an immediate resistance due to the introduction of typhoid bacteriophage into the circulation and secondly to get the antibacterial acquired immunity due to the presence of products of lysis of bacteria present in bacteriophage.

Our thanks are due to Dr. B. B. GOSWAMI, M.B., Resident Medical Officer, North Subarban Hospital, Cossipore, and other physician friends who kindly placed their patients at our disposal and helped us in the investigation of our work. *

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* Read at the Scientific Section of the IX All-India Medical Conference held in Calcutta, March, 1932.

Snake-Poisoning

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It is not frequently that we get a chance of studying deep into any case of snake-bite, because it brings the end too soon. Hence we are to study the changes and effect of snake-poisoning in such small animals as rats, cats, dogs etc. Of late, ACTON and KNOWLES made comprehensive experiments of venoms extracted from different types of snakes on rats. Their results corroborate the studies of LAUDER BRUNTON, WEIR MITCHELL, and REICHERT, MARTIN, LAMB, ROGERS and others, in that the snakes can be divided into two big classes according to the manner of action of their poison. Their classification runs as follows :

Colubridae including Cobra, Sea Snakes (Hydrophidae)—Their venom acts by paralysing the respiratory centre in the medulla and also the muscle end-plates especially the diaphragm (LAUDER BRUNTON) and though circulation can be maintained long by artificial respiration the recovery of the respiratory centre never takes place.

Viperidae including the Russell's Viper (Echis Carinatus) and the Crotalinae (rattle-snakes) etc :—Their venom acts by producing "a loss of coagulability of the blood and resulting haemorrhages." ROGERS noted a fall of blood pressure as well and proved that paralysis of the vasomotor centre in the medulla was the immediate cause of death, the heart continuing to beat to the end. When however a very large dose of viperine venom is injected, it produces a local intravascular clotting and in small animals as pigeons, leads to convulsion and death in a minute or two and the blood in portal vein, as well as in the pulmonary artery is found to be clotted. It is rarely found in man as the dose

absorbed is always proportionately less and then it causes a haemorrhagic diathesis.

Now from time to time we get reports from here and there in the Medical Journals about cases of snake-bites. Those treated successfully mostly belong to Group II. as it is not fatal before 1 or 2 days, whereas Group I. case is rapidly fatal, the patient dying within 2 to 4 hours and rarely survives 8-12 hours after the bite. In both the cases however if treatment is not begun within 10 to 15 minutes after the bite it is rarely that the patient survives as the maximal time for a minimal lethal dose to get absorbed from the site of the bite is only 10 to 15 minutes [2]. In fact the reason that we get only about 40 to 50% mortality in snake-bite is due to inadequate or unsuccessful bites [3]. The general opinion about successful treatment of any case of snake-bite is that it belonged either to the non-poisonous type or that it was an unsuccessful bite, and it is certainly rare to find an effective bite successfully treated.

I beg to report here a case of snake-bite treated in the Medical College Hospitals. The snake was seen by the patient himself and by no one else, and from want of details no definite conclusion as to the type could be determined.

The patient, a Hindu youth of 23, was bitten on the little toe of the right foot at 8 p. m. on 11-4-31 at Raniganj. He felt at first a very cold sensation in the little toe of the right foot and on suddenly giving a jerk he saw a snake falling down from off his foot. It was a black snake 2½ feet long. He tried to rush forward to kill it but suddenly felt a burning sensation in the toe. He at once sat down and with hard pressure could squeeze out a drop or two of blood. Within a few minutes a ligature was applied just below the knee-joint and a burnt charcoal over the area of bite. Within 40-50 minutes a doctor was called in who applied a second ligature over the middle of the thigh, made a crucial incision over the little toe, and applied crystals of potassium permanganate. Some blood was sucked out by somebody in the meantime. The tourniquet was removed about 11 hours after its application. The patient was admitted into the Medical College Hospitals on 13-4-31 about 36 hours after the bite.

Condition of Patient on admission: Not so bad. Temperature—99°. 2F. Blood Pressure—systolic 125 mm. Hg., diastolic—100 mm. Hg.

Local Examination: Whole right leg up to middle of thigh much swollen, indurated, brawny. Little toe—scarified, black, sloughing out. Patient complained of heaviness in the foot. Muscular movements of the right leg arrested, could bend his knee and thigh slightly.

Sensation: Superficial—lost, sensation to deep pressure—present. Reflexes—absent on right side, present on left.

Treatment in the Hospitals:

1.	Antivenene ...	40 cc. I. V. stat.	
2.	Calcium Chloride ...	10% 5 cc. I. V. stat.	
3.	Glucose Saline ...	P. R.	
4.	Antivenene ...	40 cc. I. V. (later).	
5.	Adrenaline ...	1 cc.	Hypo.
	Strychnine ...	gr. 1/60	

In the evening patient's condition turned bad, pulse and respiration rate increased. T.—99°.2 F. He had extreme nausea and vomited several times. He passed smoky urine which on examination was found to contain a few R. B. C. as well as free haemoglobin.

Ho was given antivenene—20 cc. I. V. again next morning (14th) and glucose saline P. R. with adrenaline. He passed a good day and was much better on the 15th morning. But in the evening he again became restless. T.—101°F. P.—90, R.—20. per min., complained of burning sensation all over the body and pain over the loins. 15 ounces of blood were let out (as the blood and urine examinations suggested uraemia) and afterwards 15 cc. of 10% glucose with 10 cc. normal saline injected I. V. Hot poultice was applied over the loins.

16th.—Patient a bit better. B. P.—136/95 mm Hg. Leg—condition much improved.

17th.—Patient suddenly became worse. He began to vomit greenish stuff, restless. T.—100°F. P.—90 per min. volume fair, tension—low.

Evening—a bit better, not much restlessness. Vomiting stopped. No more burning sensation over the body.

Urine—10 oz. in 8 hours quite clear. Straw-colored. No. R. B. C. or haemoglobin. B. P. 130/95 mm. Hg.

Leg—condition much improved.

18th.—Suddenly became very bad at 2 A. M., began to vomit greenish stuff. Pulse-irregular. Restless.. Sudden heart failure at 9.20 A. M.

Intracardiac adrenaline 1 c. c.—no effect.

He expired at 9.20 A. M. on 18-4-31. on the 6th day of the bite. He survived about 110 hours after the bite.

Biochemical Examination

I examined his blood for the following simply out of curiosity because there are no such records in the medical literature.

The blood examination results are as follows :

14-4-31.—Blood urea	...	0.062%.
„ N. P. N.	...	0.042%.
Van den Bergh reaction.—delayed, direct reaction—positive.		
Bilirubin content	...	2 units.
16-4-31.—Blood creatinin.	...	0.003%.
„ Calcium.	...	7mg. per 100 c.c.
„ Urea.	...	0.085%.
Van den Bergh reaction—negative.		
17-4-31.—Blood uric acid.	...	0·007%.
„ Cholesterol.	...	200 mg. per 100 c.c.
„ Chloride.	...	0.6%.
14-4-31.—Hemoglobin.	...	80%
R. B. C.—	...	4,500,000 per c.mm.
W. B. C.—	...	14,140 per c. mm.
Poly	...	68%
S. Mono	...	20%
L. Mono	...	12%
Eosin.	...	nil.

Urine Reports :

Showed albumen and granular casts, a few R. B. C. and hemoglobin persistently from 14th onwards. But on 17th there were no R. B. C. or haemoglobin in the urine, which was straw coloured too.

Discussion

The blood examination and urine examination results as well as the general condition of the patient all point to a condition of failing kidney.

Now if we consider the mode of action of the two types of venoms—we see that Group I. venoms acts by paralysing the respiratory centre in the medulla (Lauder Brunton). Formerly it was believed to have a depressor effect on the muscle end-plates especially of the diaphragm, but it has been found to have no such action [4]. It has also been found that in condition of higher pH of the medium cobra venom becomes more toxic, the M.L.D. becomes smaller and the death interval becomes shorter (at least in paramoecia) [5]. The explanations given in this connection about the venom being a digestive enzyme acting better in an acid medium (being alkaline in a solution of distilled water) or carrying a negative charge being attracted by a positive charge in an acid medium do not seem to be enough. Perhaps the pH of poisoned animals should be determined in this connection. As also the "*iso-electric points*" of both serum proteins and of the proteins in the venom,—which perhaps have an iso-electric point at a higher pH acting best when that point is reached. Perhaps there may be several toxic fractions in the venom—one acting directly on the respiratory centre producing a condition of dyspnoea which will raise the pH of the blood when the rest of the toxic fraction produces their maximum effect all at once, the whole thing acting in a vicious cycle. I put forward this explanation since if we study a case of cobra-bite we see that the patient becomes dyspnoeic at first rather slowly, but then suddenly turns blue and dies very quickly.

Group II. Venoms have been explained to act by depressing the vasomotor centre in the medulla, and also by haemolysis, which

is one of the most important symptoms in nearly all the types of viperine poisoning cases reported in the literature (ROGERS). NOGUCHI actually separated haemorrhagin, haemolysin, and neurotoxins from this venom. But in this particular case though there was haematuria, a positive delayed van den Bergh, all pointing to haemolysis, yet it was not very great—and it stopped later (clear urine and negative van den Bergh) long before death. But what appeared from biochemical examination of blood—the high blood urea, uric acid, creatinin, non-protein-nitrogen, etc. as well as the presence of albumen and granular casts in the urine, high blood pressure—all point to an inflammatory condition of the kidney. The liver was not damaged—since there was no jaundice but the brunt of the toxic action of venom fell on the kidney which became injured in an attempt to excrete the posion which was not perhaps enough to kill by its toxic action on the vaso-motor centre alone. Here the patient died of failure of the kidney (uraemia ?) no doubt, but no such cases are reported in the literature, neither this is explainable in the light of "haemolysis" theory (as all the cases reported in the literature passed blood through all the natural openings of the body and though died after 4 or 5 days after the bite no case of uraemia is reported—all dying of haemorrhage and vaso-motor paralysis). The low calcium content is of course on the side of the haemolytic theory and may explain the bleeding following viperine poisoning. According to ROGERS however, if the patient survived for a number of hours, local septic inflammatory processes are likely to be present, and a source of great danger, as in viperine poisoning death often occurs after 2 or more days from this complication. But here in this case no inflammatory process was set up locally and in fact the leg condition was actually much improved before death. Hence it cannot explain the uraemia.

The only explanation we can put forward in this particular case is that perhaps there is another fraction in the viperine venom which acts mainly on the kidney and kills by uraemia.

SUMMARY

A case of snake-bite is reported. Bio-chemical changes in this particular case point to partial haemolysis but mostly to a damaged kidney. Death in this case is explained to be due to failure of the kidney function (uraemia ?). Bleeding in the viperine poisoning may be explained by the low calcium content of the serum. Classification of snake-venoms is discussed and suggestions as to their mode of action are put forward.

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Public Water Supplies in the United Provinces.

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The cities and the larger towns in these Provinces have different types of sources of their water supply, depending on their own location. The larger cities derive their water from the rivers on the banks of which they are situated. In the hilly areas, in the Himalayas as well as in the Vindhyas, springs and upland surface waters are used ; while in the Gangetic plains deep tube wells give a supply satisfactory both as regards its quality and quantity.

The municipalities manage their own water works but the Provincial Hygiene Institute helps them by keeping an eye on the chemical and bacteriological quality of water and by making

suggestions or investigations in that connection when necessary. The Superintending Engineer, Public Health Department, helps them by looking after the engineering problems of the water works.

Table I gives a list of the water works in U. P. with sources of water supply, per capita allowance of water, information as to where samples of water are tested, while Table II (*a*) and (*b*) gives the standards for purity of water and how often samples have to be examined. It will be noticed that the standard adopted is one of the most rigid, and compares favourably with those adopted in Great Britain and U. S. A., and as will be seen from the penultimate column of Table I, the supplies attain a very high standard of achievement. Occasionally some interesting problems arise in connection with these water works and it is some of them that I would like to describe here :

I. In 1929 Dehradun Municipality decided to have a water-softening plant installed for water from Baldi spring. Soda ash and lime process was the basis of the installation that was put up by the contractors. When the plant was ready it was found that the cost of chemicals for softening was much more than what the municipality could afford. It was over four times the estimated cost. On an investigation being carried out at the Provincial Hygiene Institute laboratories it was found that in the first place the hardness was due mainly to magnesium salts which require almost double the quantity of chemicals than what is required by hardness due to calcium salts. The quantity of chemicals required had been estimated on the degree of hardness as measured by soap solution and not on a determination by actual softening of a sample of water.

Secondly, the hardness of water had actually been increasing. As a basis of estimation a figure for hardness of a year previous had been used and a fresh determination had been made. If the latter had been done and compared with the previous figures the marked rise in hardness would have been noticed and continued increase suspected. Graph I shows the rise in the hardness of water. The cost being prohibitive the softening had to be given up, and a new source of water supply found out.

II. Hardwar gets its water from three deep wells situated well away from the road joining Hardwar and Jwalapur (vide map I). One of the wells started showing bad water (both chemically and bacteriologically). About 1000 ft. away from the wells there is a siding of the railway, which employs labour gangs to take out boulders from the hill side and break them into ballast for use on the railway lines. These labourers camped near the scene of their activities and no sanitation worth the name existed. Naturally this colony with the pits near it was suspected, particularly as it was the one of the three wells nearest this activity that showed the deterioration in the quality of water and the ground sloped from the colony towards the well. Beyond an effort to clean up the place nothing more could be done to the colony. As it was there before the wells were dug, its removal could not easily be arranged particulary as the pollution of water had not been proved to be due to it. A field laboratory from the Provincial Hygiene Institute was sent out and it was hoped that definite proof incriminating the colony would be available and then steps could be taken to have it removed. Flourescin (10 grammes) had been put into the pits nearest the well, but it did not appear in the well. The quantity used had however been too small. Larger quantities could not be used (at least 1-1½ lbs. would have been necessary) as the dye was not available even in Calcutta or Bombay in such quantities. Failing this, chromogenic prodigiosus bacillus was used. A pit was selected, 600 gallons of water were run into it to soak well the ground and then 1000 c.cs. of a 24 hrs. broth culture were run in on three days with 6000 gallons more of water No B. prodigiosus appeared in the well even after 3 weeks.

On going down the well in question some water was found oozing out through the wall of the well 30 ft. below the ground level. Although the well had been cement plastered on the inside the pressure of this sewage water was so great

as to cause a good few "bullae" to form on the well surface. Although the whole well surface was wet yet from no-where water could be collected in sufficient quantities to allow of its being chemically tested. In order to collect a sample of this water two superfiicial grooves were made on the surface of the plaster, they were sloping down-wards and met at a point where a small metal spout was put into the wall. The water that oozed out from the wall trickled down vertically along the wall face till it came to and was caught in the groove and then it trickled down the groove and by means of the spout it collected drop by drop in a bottle placed to receive it.

Table III (*a*) gives the composition of this water as well as that of the water of the well, showing how grossly polluted the former was. Further down in the well (below the pumps) the wall had not been cement plastered and it allowed water to trickle through it even more. A sample of water was taken one morning and this represented water which had been standing for 24 hours in the well. Pumping out of water was then started (this water was rejected and not used for the water supply) till the lowest level was reached for the pumps to work, and another sample was taken from the well. As soon as the pumping was stopped the level began to rise; when it was half way upto the normal level, a third sample was taken and a fourth one when it reached the normal level. The whole set of samples was taken again on the second and third days,to ensure elimination of any chance results. A typical set of results is given in Table III. (*b*) It will be seen that the quality of water in the well improved as fresh supply entered it and later became worse on standing in the well. Hence it was concluded that water as it came into the well was not unsatisfactory, and that it became polluted by its stay in the well and the analysis of seepage water showed the agency responsible for it. Further this would be possible only if the water in the well was from a source different from that which percolated through its wall and as the level of the water in these wells was lower than the level of water in the canal, it was considered possible that though the ground sloped towards the canal and drained into it during rains, at least during the dry weather it was the canal that keeps the subsoil water replenished in this area. This was established definitely when the levels were taken of water in the canals and same of the wells.

Canal.	R.L.	923·7	Shown in map 1.
Well 700 ft. from canal.	R.L.	898·0	
„ 1500 „ „		895·7	
Water works well 6 furlongs from canal No. 1	„	891·0	
Water works well 6 furlongs from canal No. 2.3.	„	894·0	

This shows that the canal produced a definite change in the direction of flow of sub-soil water.

III. Last summer the water at Agra started giving unsatisfactory results. The method adopted there for filtration of the Jumna river water consists of :

1. Rapid sand filtration and chlorination by PATERSON'S method ; one million gallons per day.

2. Rapid sand filtration, without chlorination by MATHER & PLATT'S mechanical filters ; half a million gallons a day.

3. Slow sand filtration without chlorination by ordinary slow sand filters ; 4½ million gallons day.

During summer the level of water in the Jumna is very much reduced and at such times it is supplemented by water from a storage reservoir at Keetham. This reservoir is about 25 miles up the river near its bank. It is part of an old Jheel which has been connected with the irrigation canal in Agra District which forms the chief source of supply to the reservoir.

When the water in the river decreased, pools were formed in its bed and got grossly polluted with organic matter through cattle coming down for watering there. When at the request of the water works at Agra water was let into the river from the reservoir it was largely polluted by these pools in the bed of the river and put the whole of the water works out of gear.

It is believed that when this water reached the works, it being very deficient in dissolved oxygen killed the algae and the protista, which are

normally formed in all sedimentation tanks and slow sand filters, and are primarily responsible for the purification processes. This death *en masse* brought about through lack of dissolved oxygen increased very largely the quantity of organic matter in colloidal state in water—one of the most difficult problems in water purification.

The bacteriological quality of the water was to a slight extent improved by emergency chlorination directly from a chlorine cylinder to the combined effluent from slow sand filters.

A field laboratory was sent out from the Provincial Hygiene Institute to help in the investigation and the institution of remedial measures.

It was found that although more than three weeks had elapsed since the first flush from Keetham reservoir, the raw Jumna water (which was largely the water from the reservoir) still had a very high oxygen demand and a low dissolved oxygen figure. Bacteriological analysis of the samples of water from Keetham reservoir and from Jumna above and below the junction with Keetham water as well as from Jumna at Agra, showed that whereas Keetham water was not any worse than what such water can be expected to be it became far worse during its 25 miles flow down to Agra (vide Table IV).

The alkalinity of this water was so much reduced that there was not enough of it to react with the alum added for PATERSON'S filters and completely convert it into "floc" of aluminium hydroxide. The result of this was that not only proper sedimentation and formation of a good layer on the sand bed were interfered with, but also the effluent from the filters still contained some dissolved alum, which, reacting with the alkali in the water from slow sand filters, led to a deposit of the gelatinous "floc" in the clear water reservoir and the distribution reservoirs in the city. Addition of lime was recommended and adopted to obviate this.

Later on, it was the presence of this "floc" with its adsorbed impurities which often produced an unsatisfactory quality of water in the clear water reservoir even when the quality of water from the filters individually was not so bad. One of the distribution reservoirs, which had similarly accummulated some of this "floc" allowed the development of Chironomidae larvae leading to the appearance of "blood worms"—in an apparently clear and sparkling water. Systematic cleaning up of all these reservoirs and their permanganation abolished these troubles.

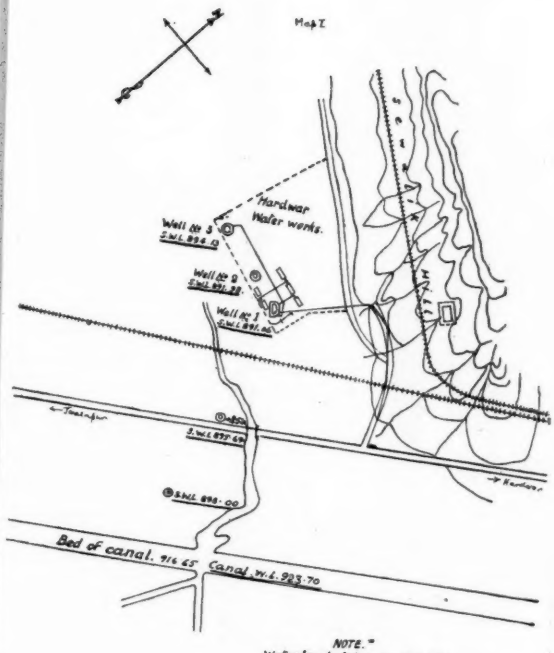
The sand in a matured slow sand filter supports a thick carpet of algae and protista (the "vital layer" of English authors and the "Schmutzedecke" of German authors) and below this the sand is quite clean. In some of the filters at Agra it was noticed that the top layer was not well developed and sand about 1 to 1½ inches below this was of the normal colour but below this again was a layer of discoloured sand about 1" thick. At times it had a faint H_2S smell. It is believed that when the amount of dissolved oxygen in the raw water came down considerably, during this time the impurities from the river were washed down, the aerobic organisms forming the vital layer were killed *en masse* and underwent anaerobic decomposition and while percolating through the depths of the sand some of the bigger particles were caught there. The condition in short was reminiscent more of a cesspool than a filter bed.

As the cleaning of the filter beds and relaying them is, at the best of times, a very slow process, the method adopted by the Superintending Engineer, Public Heath Department for rendering the supply safe was excessive chlorination of the effluent from 'rapid sand filter' which coming in contact with the 'slow sand filter' effluent rendered the whole supply safe. The amount of chlorine added was so regulated that there was a perceptible trace of free chlorine in the water leaving the water works (.01 part per million or less as estimated by ortho-toludine test).

Thus the Provincial Hygiene Institute helps in the maintenance of the rigid standards of purity of water laid down for water works in these provinces. *

* Paper read at the Scientific Section of IX All India Medical Conference held at Lucknow, December 1932.

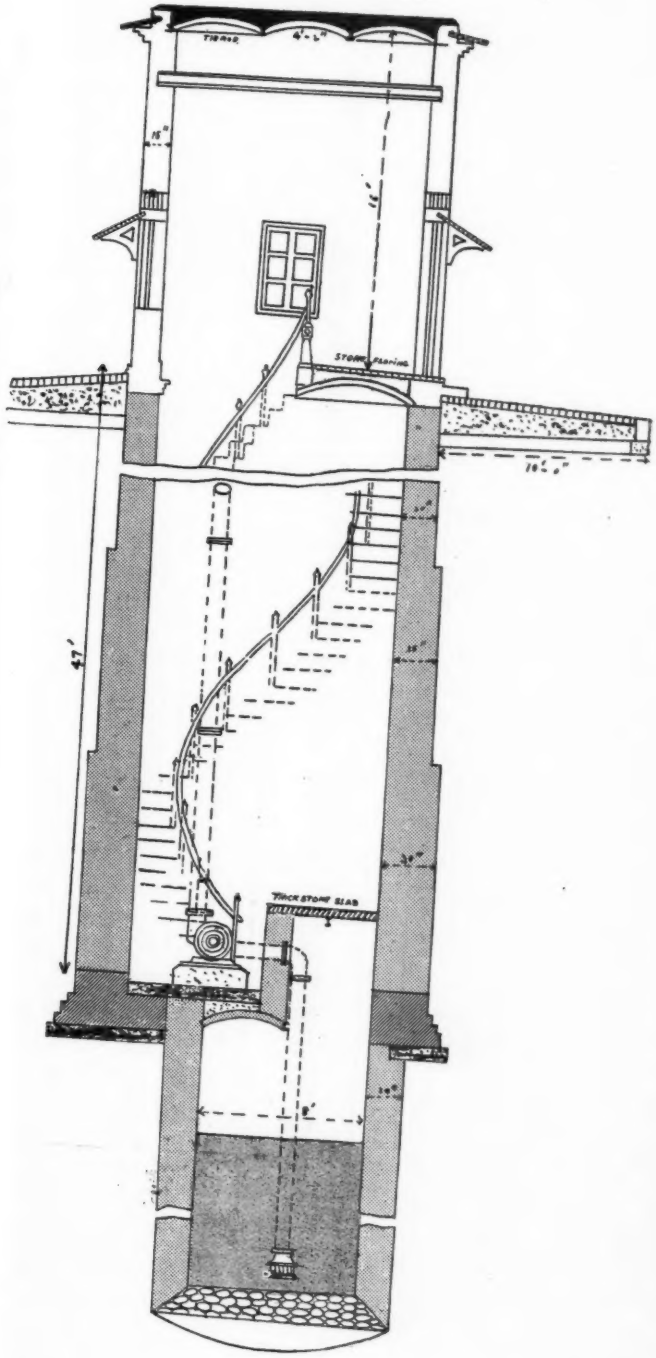
MAP I.



Hardwar Water Works Well No. 3.

CROSS SECTION

SCALE—1"=4'.



Hardness of Baldi Springwater.

DEHRADUN.

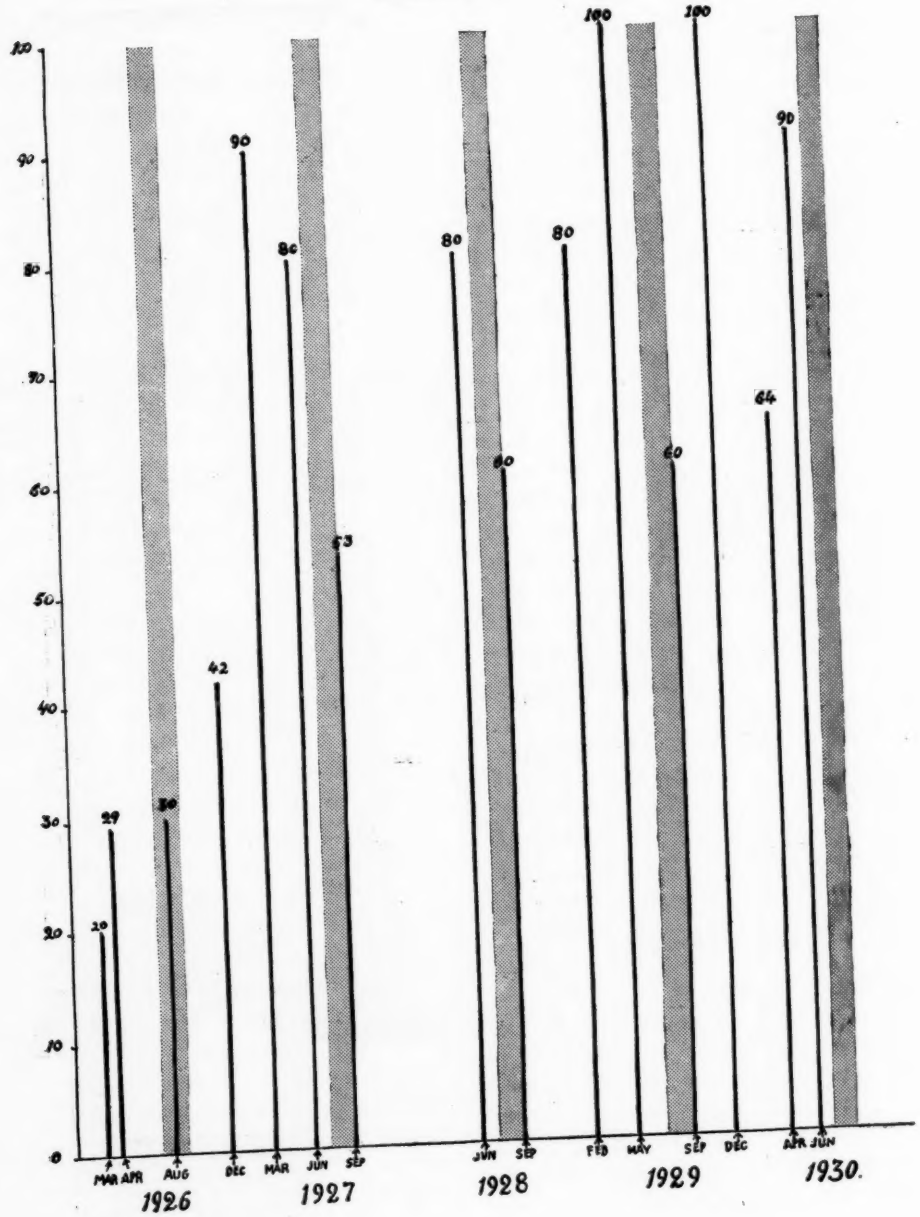


TABLE I.

Serial No.	Names of Municipalities.	Source of water supply.	Method of treatment.	Amount of water supplied per capita of population.	Population in 1931.	Number of samples analysed in 1931.			Number of samples that came up to the standard.		
						Ch.	Bac.	Total.	Ch.	Bac.	Total.
1.	Agra ...	Jumna and Kitham reservoir ...	Slow and rapid sand filtration, chlorination...	24·6	205,487	6	556	562	6	556	562
2.	Allahabad ...	Jumna ...	do ...	31·4	173,895	8	564	572	8	557	565
3.	Aligarh ...	Tube Well ...	No treatment ...	1·7	83,878	4	114	118	4	69	73
4.	Benares ...	Ganges and 2 tube wells ...	Slow sand filters untreated ...	36·9	201,037	4	573	577	4	569	573
5.	Cawnpore ...	Ganges canal ...	Puechchabal system ...	35·9	219,189	8	2349	2357	8	2174	2182
6.	Dehra Dun ...	Springs ...	No treatment ...	9·0	40,409	11	133	144	10	59	69
7.	Fayzabad ...	Tube well ...	„ ...	13·4	59,992	4	222	226	4	207	211
8.	Hardwar ...	Deep wells ...	do ...	18·6	33,287	10	448	458	10	404	414
9.	Jhansi ...	Impounding reservoir ...	do ...	6·7	64,591	...	12	12	...	1	1
10.	Lucknow ...	Gomti River ...	Chlorinated ...	27·1	251,097	6	216	222	6	148	154
11.	Muttra ...	Tube wells ...	No treatment ...	11·5	60,590	4	230	234	4	121	125
12.	Mussoorie ...	Protected springs ...	„ ...	30·0	11,040 Average.	5	135	140	5	132	137
13.	Meerut ...	Ganges canal Bhola ...	Slow sand filtration ...	14·3	91,181	8	411	419	8	411	419
14.	Mirzapur ...	Upland surface, from an impounding reservoir ...	No treatment ...	20·2	61,184	3	76	79	3	76	79
15.	Nainital ...	Spring water except in May, June and July when the water from lake is also taken ...	The supply is chlorinated duridg May, June and Juiy and occasionally disinfected with chlorine during rest of the months ...	14·4	13,558	4	110	114	4	93	97
16.	Unao ...	Tube well ...		10·5	16,282	3	31	34	3	11	14

TABLE II. (*a*)

Places from which water samples have to be analysed and the frequency of such analysis.

Nature of water supply.	Where the samples are to be collected from.	How frequently.	Nature of test to be made.
1. Unfiltered water-supply :			
Tube wells, springs, upland surface waters.	Balancing and collecting reservoirs, if any.	Weekly.	Bacteriological-colony count and lactose fermentation test.
		Quarterly.	Chemical.
	Standposts and service tanks.	Weekly.	Bacteriological-colony count and lactose fermentation test.
	Standpost if a softening plant is installed.	Quarterly.	Chemical.
2. Filtered water-supply.	Raw water.	Quarterly.	Chemical.
		Weekly.	Bacteriological-colony count.
	Prefilters if any. Each sand filter. Clear water reservoirs.	Weekly.	Bacteriological-colony count and lactose fermentation test.
	Standposts.	Weekly.	Bacteriological-colony count and lactose fermentation test.
		Quarterly.	Chemical.
3 Filtered and chlorinated water-supply.	Raw Water.	Quarterly.	Chemical.
		Weekly.	Bacteriological-colony count only.
	Prefilters, if any. Each sand filter before chlorination. Clear water reservoir *i. e.* chlorinated water.	Weekly.	Bacteriological-colony count and lactose fermentation test.
	Standposts.	Weekly.	Bacteriological-colony count and lactose fermentation test.
		Quarterly.	Chemical.

TABLE II (*b*)

Standard for the purity of water supply in United Provinces.

CHEMICAL.

1. Filtered water supplies.—
   Chlorine ... ... 1.5 parts per 100,000
   Free Ammonia ... ... .005 " " "
   Albuminoid Ammonia ... ... .011 " " "
2. Unfiltered water supplies.—
   Same as above.
3. Chemically treated water supplies.—
   Chlorine ... ... 1.5 parts per 100,000
   Free Ammonia ... ... .005 " " "
   Albuminoid Ammonia ... ... .009 " " "

BACTERIOLOGICAL.

1. Filtered water supplies.—
   (*a*) Under 100 colonies count on agar at 37°C. in 24 hours.
   (*b*) Absence of lactose fermenters in 50 c c.
2. Unfiltered water supplies from tube wells.—
   Same as above.
3. Chemically treated water supplies.—
   (*a*) Under 100 colonies on agar at 37°C. in 24 hours.
   (*b*) Absence of lactose fermenters in 100 c.c.

TABLE III *(a)*.

Comparison of water from well No. 3 and collected from the sewage through well wall.

	Total colony count.	Lactose fermenters.	F. & S. ammonia.	Album. ammonia.	Chlorides.	Nitrites.	Nitrates.	Oxygen absorbed.
Sewage through well wall ...	764	+·01	0·0072	0·012	4·8	+ +	+ +	0·54
Well water...	42	-·1	0·002	0·004	1·5	nil.	+	0·09

TABLE III *(b)*.

Sample water standing for 24 hours, before pumping started	138	+1·c.c.	0·0038	0·009	1·9	nil.	+
Level of water lowered as far as possible by pumping	230	+1·0c.	0·0016	0·005	1·6	nil.	+
Pumping stopped and level allowed to come up to normal	62	...	nil.	0·003	1·5	nil.	+
Water 24 hours later	42	-0·1	0·002	0·004	1·5	nil.	+

TABLE IV.

	Total colony count per c. c.	Lactose Fermenters.	
		24 hrs.	48 hrs.
1. Jumna water above Kitham	700	+0·1c.c.	+0·1c.c.
2. Water from Kitham reservoir	400	-0·1c.c.	-0·1c.c.
3. Jumna water below Kitham	480	-0·1c.c.	+0·1c.c.
4. Jumna at Water Works intake	600	-0·1c.c.	-0·1c.c.

JOURNAL
OF
The Indian Medical Association

Vol. III SEPTEMBER, 1933 No. 1

Editorial Comments

The Medical Council of India

Perhaps there are few measures with which our legislators have had to deal, that have occasioned so much controversy and so much feeling as the Indian Medical Council Bill. As we write it is already an Act, and so we have to write of a *fait accompli*. It was preceded by many developments which constitute a long and not always inspiring history. A little recapitulation may, therefore, be permitted to enable us to appreciate the implications of the present Act.

* * * * *

Its genesis may be traced to over a decade ago in the contention between the British medical authorities and the authorities responsible for medical training in India. The awakened political sense of India quickened by the larger freedom granted under the MONTAGU-CHELMSFORD reforms was sure to have repercussion in other fields than that of politics and it was natural that the pent up feelings of Indian medical men should have urged them to break away from the fetters of the British General Medical Council, who exerted a direct and powerful influence on medical affairs in India through the Indian Medical Service. The question of the standard of Indian medical training and recognition of Indian medical degrees in England by the General Medical Council provided the bone of contention. The threat of withdrawal of their recognition by the General Medical Council aroused no little bitterness in the mind of the Indian medical educational authorities and the suggestion to appoint an Inspector, representing the General Medical Council in India, in the person of Col. NEEDHAM, met with much hostile criticism and severe opposition from all Indian medical men. The Calcutta University took up a stroug attitude, till Government at last decided to drop the issue. The task of this inspector would have been to examine and report to the General Medical Council on the standards of medical education prevailing in India, on which would have depended the recognition of the particular degrees in England. If it did not mean interference with the medical teaching of the Indian universities, it did mean the subservience of the Indian medical faculties to this British body and an orientation to their liking. There are limits to which a self-respecting people would go, and the implications of such a position were quickly perceived.

* * * * *

It is unfortunate that this suggestion should have been regarded as a machination of the I. M. S. It is unfortunate, because admittedly Indian medical men owed much to the I. M. S. for their training and looked upon many of these men with appreciation and respect. At the same time, the privileged position of the I. M. S. was never acceptable to Indians in the medical profession, who felt that their own opportunities were thereby restricted and that while the restraining hand of this service remained they could not grow to their full stature. It could be seen that the I. M. S. was not totally disinterested in this controversy, their association with the G. M. C. was well known.

* * * * *

Of course, what was wanted was a Medical Council on the lines of those existing in other countries and the sagacity of a private member in the Assembly sought to provide the deficiency by introducing a Bill for the establishment of such a Council. With modification the Bill would have been acceptable but Government were against the measure. So it was disallowed. The British General Medical Council gave effect to their threat and withdrew recognition of Indian medical degrees. Perhaps, they considered that their action would bring the Indian Universities to their senses, if not to their knees. Actually, as events have proved, it only served to confirm them in their resentment and opposition.

* * * * *

Government realising the crisis to which things had reached, convened a conference at Simla, at which they made the fatal error of omitting the representation of the independent Indian medical section. Nevertheless, there was no little plain speaking at the conference and Government decided to give effect to its recommendations by a bill to establish an All-India Medical Council. Hope, however, gave way to despair when the draft bill was circulated, because it completely surrendered the situation to the General Medical Council and promised little or nothing in the way of improvement of status of Indian graduates and licentiates. Vigorous protest from all medical interests in India resulted in its re-drafting, but in the new draft the scope of the bill was restricted to higher medical education, which, of course, left the licentiates completely out of consideration. It caused no little uproar among the licentiates because they had hoped that the proposed council would offer a means of improving their standards and status, to which the Provincial Governments appeared unconcerned.

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It would be tedious to follow the controversy through all its tortuous ways, but a word must be said in appreciation of those Assembly members who grasped the situation with keen understanding and sought to have the many defects removed, and the bill that emerged recently from the Select Committee was undoubtedly an improvement upon anything that preceded it. That, however, in its wider aspects it is still unacceptable is no fault of theirs. As the Assembly is at present situated they could not succeed in altering the scope of the Bill and their choice was modification within the prescribed limits or no bill at all. Within those limits, therefore, the report of the Select Committee was a compromise, and as all compromises satisfactory in some respects and doubtful in others ; so that we do not really know whether to approve or condemn. As regards the head of the council is concerned, a nominated president is provided for the first four years, the election of University representative is placed with the Senates, though the qualification of five years teaching experience in the candidates has been retained. The graduates now are given direct representation. The nominees of the Local Governments and of the Governor-General-in-Council, however, remain ; though there is hope in the fact that under the new constitution these will depend on popular ministers. The Universities of Patna, Rangoon and Andhra are to receive recognition, but the most astonishing alteration is the dropping of the idea of an All-India Register. Within the limitations of the Act, which exclude the rights and privileges of registered medical men such as are found in other countries, this course was perhaps inevitable and it does have the merit of not establishing an invidious distinction between graduates and licentiates. It is also acceptable to the extent that it does leave the door open for the inclusion of the licentiates upon improvement of their standards.

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While the first object of the Act is "the securing of a uniform minimum standard of higher qualifications in medicine for all the provinces", the second is "the arrangement of schemes of reciprocity with medical authorities of other countries", and in regard to the latter a compromise is effected so far as British medical degrees are concerned. These have been placed in the second schedule, which will automatically lapse unless in the meantime a satisfactory understanding is effected with Great Britain in the matter of the recognition of Indian medical degrees. This arrangement, though at first sight somewhat revolting to our feelings in view of the treatment accorded to Indian medical degrees by the G. M. C., has, on the other hand, the merit of showing that we are not precipitated by vindictiveness and are willing to allow them to reconsider their own position, though at the same time we are not disposed to tolerate any further highhanded action on their part.

* * * * *

Before, however, we can grow eloquent in our eulogies on this point, an incident of no little significance comes to arouse in our mind the gravest apprehensions lest the cup of promise be dashed from our lips. We understand that instructions were received at the last moment by the Government of India not to proceed with the Bill ; and that it was proceeded with and passed only as a result of an understanding arrived at between the Government and the various party leaders. We re-iterate this incident is not without grave significance, for it shows how much we have been hitherto under external influence in England and how sensitive certain sections must be to their interests. We do not doubt that, even at this moment, so strangely they may be concerned at the implications of the present Act, they are taking steps to induce the Parliamentary Joint Select Committee to adopt strict measures to "safeguard" their particular interests and privileges. As it is, the present Act gives the last word to the Governor-General-in-Council, which means a supersession of the decisions of the Council, if necessary, though it is presumed that the Governor-General would seldom, if ever, differ from the decisions of the Council. If this is not sufficient as a safeguard, we doubt what will satisfy the interests concerned, but we

sincerely hope that no such attempt will be made to render negatory the small gains which have been received.

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A fact that should not be overlooked is that the Provincial Medical Acts provide a section for automatic recognition of British medical degrees. It would be a queer situation if between a Provincial Government and the Government of India certain degrees were recognised by one and not by the other. It would appear that certain amendments of the Provincial Acts are necessary to bring them into conformity with the reciprocity provisions of the Act under discussion.

* * * * *

Thus, we close another chapter in this long drawn out question. We cannot close it by remarking on the bitterness it has aroused. A contemporary reminds us that after all we are committed to an expenditure of about a lakh of rupees for what an inspector or commissioner as once suggested would have done for much less; unfortunately this criticism is only too true, even considering the preservation of our self-respect; and it remains with the provinces to make the requisite alterations in their Acts to attain to the height of SIR FAZLI HOSSAIN'S ideal of "efficiency at home and honour abroad".

Case Note

An unusual Case of Haemorrhage from the Stomach

By P. KAR, M.B., Dacca.

I was called in to see a case on the 20th August, 1932. The patient S. D. was a girl of about 15 years, unmarried. Her complaints were (1) pain in the lower abdomen and loin; (2) very scanty menstruation which had been always irregular and (3) slight constipation.

The patient looked anaemic and weak. There was no fever or any other complaints. On examination, the spleen was found enlarged about 2" below the costal margin. No other evidence of an organic lesion could be elicited. She used to get malarial fever occasionally.

The patient was being treated for dysmenorrhoea for two days and was feeling much better. During the whole day and night of the third day of her illness she was doing quite well; but at about 2-30 a.m. she suddenly vomited a little clotted blood, which was dark red in colour. She never complained of any discomfort then. She was given ice to suck and ice on the abdomen. Bromide and calcium were given by mouth. The patient had sound sleep the rest of the night.

Next morning, the patient had no other trouble except weakness. One qualified lady doctor examined her and found the uterus infantile. On that very day at about 2-30 p.m. she suddenly began to vomit blood which was really very large in quantity. There was no pain or tenderness over the abdomen. Before vomiting blood, she felt a sort of heaviness in the stomach. The pulse was very feeble and quick and temperature subnormal. The patient began to vomit black clotted and bright red blood every 15 to 20 minutes. Every time she vomited blood, she complained of a heavy sensation in her stomach. She was given morphia, intravenous calcium chloride, ice to suck, ice over the abdomen but nothing could stop bleeding. She began to sink down, and serum was lastly tried but to no effect. The poor patient expired within a few hours' time due to loss of blood.

Comments

1. Was it a case of enlarged spleen either due to kala-azar or malaria which caused such haemorrhage from the stomach and brought out this tragic end? If so, then it must have been a rare case of haemorrhage which could bring such a catastrophe.

2 Could this haemorrhage be due to oesophageal varix?

3. What is the benefit of giving calcium instead of serum in haemorrhage when we find that there is no deficiency in blood calcium?

4. Are haemoplastic sera likely to act better than calcium salts? Which one should be given first preference, when there is a belief that the simultaneous administration of calcium retards the action of haemostatic serum?

5. Can we depend on calcium in such a case? Some assert that the idea of calcium chloride or any other preparation prompting coagulation of blood in all kinds of haemorrhage is based on somewhat vague grounds, because in any case of haemorrhage it is very unlikely that there is any marked deficiency in blood calcium.

Current Medical Literature

MEDICINE

Gastric Secretion and Vitamin Deficiency

B. P. BABKIN and his colleagues (Canad. Med. Assoc. Jour., 5, July 1933, Ref. Lancet, 603, Sept. 9, 1933) report that variations of gastric secretion under nervous and other stimuli are influenced to a considerable extent by diet and especially by the presence or absence of vitamin B. In the early stages of their investigations, they found that splanchnic nerve stimulation in cats produced only a small mucoid gastric secretion, which was alkaline in reaction ; stimulation of the vagi, on the other hand, evoked a copious gastric secretion of high acidity, rich in pepsin, and of great digestive power. The most interesting part of their work, however, lies in the changes which were found in the gastric juice when the animals were kept for a time on a vitamin-free diet. Thus a dog on a full diet was found to produce 56 c. cm. of gastric juice in thirty minutes after an injection of 0· 75 mg. of histamine, whereas eight days after all vitamins had been removed from the diet, the same injection only produced 4· 6. c. cm. When a small quantity of powdered yeast (10gm.) was added to the diet the normal response was noted again after three days' feeding. The same failure of response of the gastric secretion on removal of vitamin B from diet was noted when sham-feeding was carried out or 5 per cent. alcohol was introduced into the intestine. This change in secretory response with diet deficiency is suggestive in relation to the work of the last few years on pernicious anaemia. *J. C. B.*

The Clinical Significance of Gastric Acidity

Z. SAGAL, J. A. MARKS and J. L. KANTOR (Annals Int. Med. No. 1, Vol 7, 76, 1933) report from a series of 6679 test meals analysed according to the age and other factors, that age next to constitutional predisposition, appears to be the dominating factor in gastric acidity. The greatest incidence of high acidity occurs in the earlier age groups, while the low acid figures predominate in the later decades.

Certain diseases are associated with special ranges of acidity (*e. g.*, duodenal ulcer with hyper-acidity, pernicious anaemia and cancer of the stomach with achlorhydria), but these acid levels precede the development of the disease and persist after its cure. This degree of acidity predisposes to a given disease rather than the disease produces a change in acidity.

The fifth decade constitutes the peak of functional acidity as is evidenced by the greater proportion of high acidities, while diminishing gastric acidities may be considered as evidence of aging, and the presence of high acid values in old age may be considered as an index to longevity.

The discrimination of gastric acidity is of practical value as an index to predisposition to certain diseases and as a guide to important therapeutic procedures.

In older patients, under observation for comparatively long periods, there is a tendency to a diminution of gastric acidity. *J. N. D.*

Weakness and Failure of Left Ventricle without Failure of Right Ventricle : Clinical Recognition

P. D. WHITE (Jour. Amer. Med. Assoc. June 24, 1933, Ref. Med. Times, Sept. 1933) from a study of 400 consecutive cases of organic heart disease, concludes that weakness and congestive failure of the left ventricle are common whether or not there is an associated right ventricle failure.

It is important to recognise this fact and to be able to diagnose the condition, since treatment by the administration of digitalis, by rest or by both of these measures is usually of great help, even though there is no evidence of congestion of the systemic veins. The left ventricle is the primary site of strain from four to five times more often than is the right ventricle, owing to essential hypertension, myocardial infarction, coronary thrombosis (which rarely involves the right ventricle) and aortic valve disease exceeding in total frequency mitral stenosis, pulmonary valve stenosis and pulmonary disease sufficient in degree to be a strain. Cases of heart failure without obvious factors of strain like those mentioned are not common. The most frequent cause of strain on, and enlargement and failure of, the right ventricle is left ventricular failure. The important signs and symptoms that point to weakness and failure of the left ventricle in the absence of mitral stenosis and congenital heart disease are (1) cardiac dyspnoea, (2) cardiac asthma or acute pulmonary oedema, (3) diminishing vital capacity due to heart disease (4) engorgement of the roentgen shadows of the lung hilus blood vessels (5) proto-diastolic gallop rhythm at the cardiac apex in the absence of heart block (6) pulsus alternans (7) increasing accentuation of the pulmonary second heart sound. The failure in the past to visualise congested blood vessels easily in the lungs accounts for the unwarranted emphasis placed on increase of systemic venous pressure in congestive heart failure. *J. C. B.*

Coronary Thrombosis

E. FRANK (Therap. d. Gegenw. 1933 Ref. Ars Medici No. 6 : 252, 1933) points out that coronary thrombosis should be considered when attacks of excruciating anginous pain occur in the fifties whilst the patient is absolutely at rest or asleep. If the pain is not relieved by nitroglyecrine and accompanied by striking tachycardia, profuse sweats, nausea and vomiting, if the patient looks sallow and wasted and presents the appearance of a shock, a lesion of the myocardium may be looked for. Leucocytosis, accelerated sedimentation rate of erythrocyte, rise of temperature, pericarditic friction and a striking lowering of the blood pressure from 230 to 120 and from 150 to 85 after the subsidence of the pain are the characteristic clinical features. The descending limb of the main deflection R does not return immediately to the abscissa but either continues to run horizontally or rise again in a dome shaped peak. On the following days the limb again descends gradually and a negative T develops. The R. T. interval assumes more and more upward convex form whilst the acute secondary deflection becomes deeper and deeper, the so called coronary T, which persists for long. It is also possible to draw conclusions as to the site of infraction from the electrocardiogram. If the typical change is found with the first lead, the infarction is usually at the apex of the heart and in the adjoining part of the anterior wall of the left ventricle (thrombosis of the diescending branch of the left coronary artery). If withthe third lead, it is usually in the upper part of the posterior wall of the left ventricle (thrombosis of the branches of the right coronary). Even when the right main branch is occluded the right ventricle is only slightly involved. In view of the collapse, the hardness of the abdominal walls, the vomiting and the sudden, extremely acute epigastric pain, the wrong diagnosis of perforated ulcer, necrosis of the pancreas can easily be made.

If the patient survives the first few days and the cardiac insufficiency not extreme, the prognosis is not unfavourable. Majority of middle-aged patients usually get over infarction of the heart after a prolonged period of illness and generally succumb to a fresh thrombosis or progressive arteriosclerosis of the coronary arteries. The unbearable pain of the acute attack is combated by 1/3 gr. of morphine with 1/30 gr. of atropine. Morphine is not dangerous iu severe attacks of angina pectoris as is shown by LEVINE and PARKINSON. The most important stimulant for the first few hours is caffein sodii salicylas 3½ grs. hypodermically every 1¼ hours. Hexeton, cardiazol, coramin may also be given. The intravenous injection of euphyllin and of strophanthin should be avoided. The patient must be kept strictly in bed for 4-8 weeks and he should observe the greatest care for at least two months after that and can resume his occupation after 6 months. Patient's mental and physical rest should be secured by small doses of luminal gr. ¾. As long as the low blood pressure persists, the patient should have absolute rest and any stimulation of the heart should be avoided. Fairly intense treatment by digitalis is indicated when there is pronounced cardiac insufficiency. On the other hand, it is advisable by the administration of sympatol, very small doses of digitalis (½ tablet verodigen twice daily) or calcium (Sandoz) intramuscularly (5 c.c. of a 10% solution once or twice a day) to improve the tone of the heart and prevent stagnation. Sympatol is of the greatest value, it is an adrenaline preparation which reinforces the systole without increasing the blood pressure. The dosage is 30 drops of sympatol 3 or 4 times daily or 1-1½ c. c. hypodermically 2 or 3 times daily.

It is desirable in every case to produce dilatation of the coronary arteries so as to ensure supply of blood and thus promote healing process. For this purpose euphyllin gr. V should be given every other day, morning and afternoon per rectum, and on intervening days one tablet Theominal 3-4 times. When anginous troubles are fairly severe nitroglycerine should be given. *J. N. D.*

Measuring the Variability of Blood Pressure

E. A. HINES and G. E. BROWN, (Annals Int. Med. Vol. 7, 217, Aug. 1933) conclude as a result of their experimental observations that :—

1. There is evidence that certain subjects have a constitutional or biologic abnormality leading to the development of essential hypertension.

2. It is theoretically possible to demonstrate this abnormality years before the onset of clinically recognisable high blood pressure.

3. According to a standard test, subjects can be grouped as those with minimal and those with excessive responses of the systemic blood pressure to sensory and psychic stimulation.

4. There is some evidence that the so-called normal subjects who exhibit this hyper reactivity, will eventually suffer from hypertension unless development of this condition is forestalled.

5. At least 98 per cent of all subjects with essential hypertension show excessive reaction to local cold. Subjects with other diseases have normal or minimal reactions.

6. The cold test is useful in determining the efficiency of therapeutic measures to control the vasomotor irritability. *J. C. B.*

Viatmin B in Diabetes

M. LABBE, P. NEPVEUX and J. D. GRINGOIRE (Bull. de Acad. de Med. 689, May 23, 1933.) draw attention to the important action of the vitamin B complex (B_1, B_2, B_3) on carbohydrate metabolism. It favours the glycogenic function of the liver and increases its content of oxide-reducers. Vitamin therapy in diabetic patients lessens the glycosuria and glycaemia, increases their tolerance for carbohydrates, improves their general condition, and increases their weight. With doses of 18 grams of powdered vitamins the present authors noted an increased sugar tolerance of 40 to 50 grams, which nearly equals that obtained by 32 to 40 units of insulin. The improvement is progressive but slow (the tolerance increasing by about 1 gram and the glycosuria lessening by 1.7 grams daily); therefore, at the commencement of treatment insulin should also be given. As the tolerance increases the injections of insulin may be decreased or even discontinued. To illustrate the foregoing points notes are given of eleven diabetic cases. Favourable results were obtained in eight; in one case a regulation of the carbohydrate metabolism without diminution of the glycosuria was noted; the remaining two cases showed no improvement. That vitamins can be given orally is of appreciable advantage to the patient.

J. N. D.

Ascorbic Acid in Scurvy

PAUL SCHULTZER (Lancet, 589, Sept. 9, 1933) reports the case of a man who developed scurvy under a diet which was deficient in Viatmin C. There was also an alcoholic gastritis and a consequent gastric achylia. The man was kept in hospital on a deficient diet and the scorbutic symptoms grew worse. Then he was given daily intravenous injections of 40 mg. ascorbic acid which resulted in a rapid recovery from the scurvy.

J. C. B.

Roentgen Signs of Infantile Scurvy

K. KATO (Radiology, 18: 1096, June 1932, Ref. Amer. Jour. Dis. Child No. 1, July, 1933) describes the clinical and radiological findings in 13 cases of infantile scurvy. The majority of the usual roentgen signs in the bones are not pathognomonic for infantile scurvy. The one sign that is absolutely unique is that of subperiosteal haemorrhage. The white line of Fraenkel, *Trummerfeldzone*, WIMBERGER's sign, separation of epiphyses and beading of the ribs may all be found in other conditions and are not absolutely characteristic of scurvy.

J. C. B.

SURGERY

The Surgical Treatment of Angina Pectoris

J. C. WHITE (Annals Int. Med. Vol. 7, No. 2 August, 1933) as a result of experimental and clinical studies, points out that the effectiveness of any surgical procedure on the treatment of angina pectoris is due to the blocking of the afferent pain pathways from the heart, though some writers believe that the benefit of operation is due to the interruption of the cardio-pressor reflexes. For proper blocking of the afferent pathways, the author draws attention to the following anatomical and physiological premises.

1. Pain from the heart and ascending aorta is conveyed to the sympathetic trunk by fibres, running in; (*a*) the middle and inferior cardiac nerves to the corresponding cervical sympathetic ganglia (*b*) recently discovered nerves which run directly across the mediastinum from the posterior cardiac plexus to the upper thoracic ganglia. The painful stimuli thence enter the spinal nerves through the white communicantes rami. As there are no white rami in the cervical region, all pain sensation referred over the cervical sympathetic trunk must descend to the upper thoracic ganglia before it can reach the spinal cord. Therefore impulses traversing either of these routes converge on the upper thoracic sympathetic ganglia to reach the spinal cord *via* their white rami communicantes and the corresponding posterior spinal roots.

Pain referred to the left or right precordium or the arm enters the cord only on the same side. The vagus nerve carries no important pain fibres from the heart. Desensitizing the skin areas, to which cardiac pain is referred, by section of intercostal nerves, does not give permanent relief of cardiac pain.

2. Operations on the cervical sympathetic trunk, even if they include the stellate ganglia, cannot block the pain pathways.

3. The upper thoracic sympathetic ganglia or their communicant rami or the posterior roots of the corresponding spinal nerves are the logical points to interrupt painful stimuli from the heart.

From an experience based on 32 cases the author concludes: (*a*) Paravertebral alcohol injection, though technically difficult because of the depth of the nerves and the small areas sclerosed by alcohol, is the safest method and its results are far better than the old forms of cervical sympathectomy.

(*b*) Resection of the upper thoracic sympathetic ganglia which was done in 4 cases, was followed by striking relief of pain on the operated side. But the operation is too severe for the average patient suffering from angina pectoris.

(*c*) The best surgical procedure consists of first attempting to block the thoracic sympathetic nerves with alcohol. Cases where satisfactory relief is not obtained, may be subjected to section of the posterior spinal roots, provided they are reasonably good surgical risks.

J. C. B.

NEUROLOGY AND PSYCHIATRY

Sciatica with Root Symptoms

A. LOEW (Med. Klinik. No. 6, 1933 Ref. Ars Medici No. 7, 1933) reports that sciatica with root symptoms is a common occurrence among sportsmen due to an undue strain on the vertebral column. As a result of frequent small traumas, spondylarthrosis and chronic periostitis in the region of the nerve roots develop. He also records gratifying results of lumbar puncture, in 9 cases, with quick relief of pain in the sacral region whereas peripheral sciatica was unaffected by lumbar puncture. The author points out to the fact that in the region of the intervertebral foramina processes of dura mater form sheaths round the roots of the sciatic nerve after their exit from the dura mater spinalis. Root periostitis evidently causes stasis and pressure on the efferent roots and lumbar puncture relieves the pressure and promotes the circulation.

J. C. B.

Neurological Aspects of Suprarenal Insufficiency

L. H. CORNWALL (New York State Jour. Med. 642 May, 1933, Ref : B. M. J. 43, Sept. 1933) reports three cases of suprarenal insufficiency illustrating certain neurological phases. In one with bilateral gumma in these glands sudden unconsciousness followed by stupor with short lapses of consciousness during which there was, however, confusion of mentality with disorientation as regards time, place and person. The second case was characterised by spasms of abnormal pains with anorexia, eructation of gas and nausea. These diminished when cortin was administered. The third case resembled epidemic encephalitis. The author considers the sudden coma of the first case as an indication of circulatory collapse, due to influences operating on sympathetic nervous system. The crises of visceral pain in the second case are attributed to paroxysmal dysfunction of this system and the cerebral symptoms in the last case due to anoxaemia of the brain due to vaso-constriction of the cerebral arterioles or conversely to loss of vascular tone accompanied by vaso-dilatation. In addition to the classical symptoms of suprarenal deficiency CORNWALL mentions a tendency for a rise in the nitrogen content of the blood in the absence of any manifest renal disorder, the occurrence of hypoglycaemia and an increase of creatin excretion and according to him this excessive creatinuria is an important feature of the characteristic metabolic disturbance. He adds that there is little tolerance for such minor operative measure as intravenous administrations as the threshhold for shock is very low. He thinks that the therapeutic medication of cortin is a valuable one.

J. N. D.

OBSTETRICS AND GYNAECOLOGY

Paravertebral Anaesthesia in Obstetrics

J. G. P. CLELAND (Surg. Gyn. and Obst. 51, July, 1933) makes a survey of the present status of the knowledge of uterine afferent nerves and concludes the following from the experimental and clinical results on animals and pregnant women :

1. The pains of labour are made up of two components, *viz.* (*a*) that due to uterine contraction which is transmitted by afferent fibres through the eleventh and twelfth thoracic roots ; (*b*) due to stretching of the birth canal, which is transmitted through certain undetermined sacral roots.

2. Paravertebral block of eleventh and twelfth thoracic roots will abolish the pain of uterine contraction for a length of time varying with the type of anaesthetic used without appreciably affecting the tone of the uterus or the degree, frequency, or duration of contractions.

3. The pain of dilatation of the birth canal may be abolished by caudal block with about 20 c.c. of novocain 1 per cent or nupercaine 1 : 500 for varying lengths of time dependent on the type of anaesthetic used, without depressing the tone or contraction of the uterus.

4. While the eleventh and twelfth thoracic roots are blocked there is no hyperaesthesia ; whereas in the absence of such anaesthesia the painful impulses may spread in the cord to produce hyperaesthesia in other segments adjacent to those receiving the painful impulses.

5. The combination of paravertebral and caudal anaesthesia, in a safe dosage, is feasible in labour, and the block, which may last as long as eight hours, may be safely repeated.

A. N. R.

PEDIATRICS

The Dose of Quinine in Malaria

A. LICHTENSTEIN, (Nederl. Tijdscher. v. Genesk : 76, 3143, 1932) reports from an exclusive comparative examination that the malaria parasites in Malang (Dutch Indies) die as quickly from O. 6 gm. of quinine hydrochloride as from a dose of 1. 2 gm. of quinine ; also that the symptoms of the disease disappear with equal

rapidity. The following explanation is given. The human body possesses a certain quantity of antibodies, often sufficient to conquer a slight attack of malaria. Quinine partly destroys the malarial parasites, so that antigens are set free which may stimulate the formation of immune substances. Those immune substances are able to destroy malarial parasites, with the effect that new antigens are set free which stimulate the formation of immune substances. In order to start this process, a relatively small optimum dose of quinine is necessary.

In malaria perniciosa one has to deal with very resistant malarial parasites, so that the formation of antigen is very slow ; the immune substances also appear very slowly in the circulation, so that it takes a longer time to overcome an attack.

Experience teaches us that 30 mgm. of plasmochin is sufficient to kill the gametes, and the author recommends a dose of 0.6 mgm. of quinine hydrochloride and 30 mgm. of plasmochin as the basis for the treatment of malaria.

K. C. C.

Hepatomegaly of von Gierke

L. SCHALL, (Muen. med. Woch. 2, 2078,1932) describes three cases of hepatomegalia glycogenetica of VON GIERKE whose ages were 8½ years, 4 years and 14 months, the last two being boys. The important signs are the enormous size of the liver from early infancy, hypoglycaemia without the clinical picture of hypoglycaemia, and inability to mobilise glycogen after adrenalin administration. Obesity, ketonæmia and muscular weakness are sometimes present. It is possible that the disease is due to a functional disturbance of the liver.

K. C. C.

Anaemia resembling Constitutional Infantile Pernicious anaemia

H. C. VAN Leeurven, (Folio Haemat. 49,434, 1933) reports the case of a five years old child with anaemia characterised by hyperchromia, macrocytosis, leucopenia, thrombopenia with haemorrhages. There was free hydrochloric acid in gastric secretion. Iron, arsenic and liver extract were tried without any effect. Blood transfusion now and again did some good. Splenectomy was useless. It was quite unusual that notwithstanding high grade anaemia, there was large number of nucleated and other cells stained with supra-vital stain. Autopsy showed that there was hypoplasia of bone-marrow as also of tissues. One kidney and one metacarpal bone were missing. In the literature, the author states, only four such cases have been reported.

K. C. C.

Iron in Infant Nutrition

A. WALLGREN, (Rev. franc. de pediat. 7:257, 1932) found the iron content in mother's milk to average 0.437 mg. in a liter, in goat's milk, 0.356 mg. and in cow's milk, 0.239 mg. In cheese it varied greatly according to the method of preparations and the country from which milk supply was obtained. In French cheese the iron content varied from 0.004 to 0.24 mg. in a gram. In cereals the content of iron varies as to whether it is melted or not. In milled rice the iron content averages only 0.0067 mg. per gram while in whole rice it averages 0·109 mg. Of the many brands of breads Graham bread has the highest iron content averaging 0·059 mg. in a gram. Among the fruits the iron content in cherries averages 0.0038 mg. in a gram, while that of black raisins with pips is 0·0032 mg. In the vegetables, the content of spinach averages 0·054 mg. in a gram. In cocoa, which is classed as of vegetable origin, the surprisingly high amount of 0·744 mg. in a gram is found. Beef is the meat with the highest iron content being 0.024 mg. in a gram, in eggs 0·0482 mg., and in blood pudding, 0.212 mg. in a gram.

K. C. C.

Progressive Syndrome of Muscular Rigidity and Toxic Involuntary Movements

J. P. MARTIN, (Proc. Roy. Soc. Med. 26, 847, 1933) reports that a 15 year old boy was normal until 6 years. Then he began to drag his leg and to be awkward with his right hand. During the next 6 years his condition became worse and at twelve he could not walk about any more. During the last 2 years his head has gradually tended to bend forward and his right hand makes slow involuntary movements which carry it either against his chin or right up over his head to the back of his neck.

The patient sits in a fixed, huddled attitude with his neck flexed. His mentality is normal and there was no speech defect. The right upper limb normally assumes a flexed posture. It is subject to long-sustained flexion spasms. When the hand is extended its posture is markedly athetoid. No involuntary movements occur in the left arm. The right lower limb is subject to slow flexor spasms. In all limbs there is great resistance to passive movements. The tendon jerks are all brisk. One great toe is constantly in an extended position.

The author is inclined to think that the lesion is extra-pyramidal. This is evidently a progressive disease but as to its underlying pathology he kept an open mind. He supposed that it was due to some form of degeneration of the basal nuceei.

K. C. C.

Medical Associations, Societies, etc.

Medical Societies, Associations, Unions etc. are invited to make use of this Section of the Journal.. —EDITOR

The All India Medical Licentiates' Association.

A statistical enquiry into the various causes of bronchial asthma with a view to find out some effective cure, is proposed to be conducted under the auspices of the All India Medical Licentiates' Association.

Rules of the enquiry.

I. This enquiry shall be conducted under the direct control of the Scientific Research Committee of the Association and shall be open to Medical Licentiates residing in India including Burma.

II. These statistics shall be collected in prescribed forms which shall be supplied by the Secretary Scientific Research Committee on application.

III. The data so collected shall be submitted to the Secretary Scientific Research Committee so as to reach him not later than the 1st of November 1933 after which date no work shall be considered.

IV. Three honorariums of Rs. 200/-, 150/- and 100/- shall be awarded for the best three findings in order of merit.

V. Only the members of the All India Medical Licentiates' Association shall be eligible for these honorariums ; but the members of the Scientific Research Committee shall be debarred from competing for them.

VI. The Scientific Research Committee shall reserve the right to withhold any of the honorariums if, in its opinion, no work merits distinction.

VII. Before arriving at a final decision the Committee may, if so chooses get the statistics of a particular area verified at the spot with the cooperation of the worker concerned.

VIII In the award of these honorariums the decision of the Scientific Research Committee shall be final. The Committee may, if it deems necessary, seek some expert advice in arriving at a decision.

IX. The decision of the Committee shall be announced at the next annual conference of the Association following 1st November 1933.

X. The findings shall, in the ordinary course of time, be published in the Indian Medical Journal. The competitors shall, however, be prohibited from publishing their findings in any other journal without the permission of the Scientific Research Committee.

Form of enquiry.

1. Name of the patient.
2. Name of father or husband.
3. Age.
4. Sex.
5. Community.
6. Permanent residence.
   (*a*) Name of the village or town.
   (*b*) Tahsil or pargana.
   (*c*) District.
   (*d*) Province.
7. Population of the village or town.
8. Water supply of the locality.
9. Average annual rainfall.
10. Height above sea level.
11. General environments of the locality with special reference to the presence of dust or smoke.
12. Family history : whether any of his parents suffered from
   (*a*) Asthma
   (*b*) Hay fever.
   (*c*) Urticaria
   (*d*) Migraine.
13. Occupation of the patient.
14. Diet whether pure vegetarian or mixed.
15. Association with conditions like
   (*a*) Eczema
   (*b*) Urticaria
   (*c*) Migraine
   (*d*) Biliousness (in children).
16. Presence of other respiratory diseases.
17. In the case of females if the disease has any relation with menses or menopause.
18. Condition of digestion :

(*a*) Presence of achlorhydria or hypochlorhydria (to be ascertained by chemical analysis of gastric contents after a test meal)

(*b*) Presence of undigested meat or protein fibres or excess of starch in stools.

19. Blood pressure :
   (*a*) Systolic
   (*b*) Diastolic.
20. Condition of nose as to the presence of
   (*a*) Sinusitis
   (*b*) Polypi
21. Examination of sputum for gram-negative and other organisms.
22. Differential leucocytic count for the presence of eosinophilia.
23. Urine analysis specially for the presence of proteoses.
24. Any psychological effect of drugs or foods.
25. Sensitiveness to hairs, feathers or other animal products.
26. Any treatment whether western or indigenous from which the patient derived most benefit.
27. Other observations and remarks.

N. B.—For further particulars please refer to DR. CHHABILDAS Secretary Scientific Research Committee, DALHOUSIE (PUNJAB).

Association Notes

Central Council

Abstract proceedings of the XXIV Meeting af the Central Council of the Indian Medical Association on the 15th August, 1933.

Members present.—SIR NILRATAN SIRCAR (Chairman) DR. B. C. ROY, A. C. UKIL, H. GHOSH, J. N. BOSE, A. C. SEN, S. P. SEN GUPTA, H. N. RAY, S. C. SEN GUPTA, K. C. CHOWDHURI, R. C. SEN, A. K. CHAKRABORTY.

The Council recorded its deep sense of sorrow at the untimely death of DR. J. P. SANYAL, a member of the Lucknow Medical Association and direct that a copy of this resolutions be forwarded to the said branch and to the relations of late DR. J. P. SANYAL.

Resolved that in order to remove any objection under the Government Servants' Conduct Rules against medical men in Government service being members of this Association Rule 2(i) contained in the Objects of the Association be deleted and the remaining sub-rules of Rule 2 be renumbered in accordance with this alteration.

Resolved that the letters received from various members of the Indian Delegation to the Parliamentary Joint Select Committee be recorded and that they be thanked for their offers of assistance to further and protect the cause of the Indian medical profession.

Resolved that the Secretary's action in writing to the members of the Indian Delegation to the Parliamentary Joint Select Committee be approved.

The idea underlying Major M. G. NAIDU'S suggestion of a joint conference with the Licentiate Medical Practitioners was approved and the Secretary was requested to negotiate to this end.

The following nominations were received for the Presidentship and it was resolved that the nominations be recirculated to the various branches for final election in accordance with Rule 22 :—

DR. M. A. ANSARI, Col. Kukde, Rai Bahadur DR. B. N. VYAS, SIR NILRATAN SIRCAR, DR. B. C. ROY, Col. BHOLA NAUTH, DR. JIVRAJ MEHTA.

Resolved that DR. RAMA RAU (Madras), DR. J. N. BOSE (Bengal) and Rai Bahadur DR. B. N. VYAS (Lucknow) be elected Vice-Presidents for the year 1934 under Rule 23.

Resolved that a committee composed of the following :

SIR NILRATAN SIRCAR, DRS. B. C. ROY, A. C. UKIL, S. C. SEN GUPTA, A. K. SEN GUPTA and K. S. RAY be appointed to examine and report on the draft rules for the All-India Medical Conference and that their report be considered at the next meeting of Central Council. A delegation fee of Rs. 5/- per delegate was fixed.

With reference to the question of branches not conforming to the rules regarding payment of contributions to the Central Funds, it was resolved that the opinions so far received from the various branches be summarised and circulated to the branches for further consideration.

The report of progress in regard to preparations for the next All-India Medical Conference to be held at Bombay during Christmas with DR. G. V. DESHMUKH as Chairman of the Reception Committee was recorded.

The Council was of opinion that the suggestion of the Jubbulpore Branch regarding registration of the Indian Medical Association be circulated for opinion and that it be placed on the Agenda of the next General Meeting of the Association.

The Allahabad Medical Association

(Affiliated to I. M. A.)

A general meeting of the Association was held on August 18th, with MAJOR D. R. RANJIT SINGH in the Chair. DR. S. MUSTAFA "At home" to the members and guests of the evening. A popular cinematograph film was shown on "Tuberculosis" and how it may be avoided.

An interesting paper on "Artificial Pneumothorax in the treatment of Pulmonary Tuberculosis" was read by DR. CHATURVADI of the Jumna Dispensaries. The lecturer explained in detail the various stages in the technique of the procedure, its indications and contra-indications, the apparatus as used by him, the selection of cases for this kind of treatment, the results achieved, and the dangers and complications of the operation. He stressed the desirability of carrying out the treatment, even in the absence of X-ray examination, depending on clinical and physical findings in a particular case, though the help of X-ray control was recognised as a valuable asset in conducting the treatment properly.

The lecturer presented a synopsis of fifty representative cases treated in the Jumna Dispensaries during three years 1930 to 1933 and demonstrated the patients treated. In this group of 50 case reports, which he presented 33 were males and 17 females. The males ranged from 15 years to 80 years of age, and the females from 13 to 33 years. These people belonged to various occupational classes, such as cultivators, merchants, servants, teachers, students, and the females were engaged in house-hold work only. The duration of illness ranged from 3 months to 5 years in different patients and the number of fills used were from 2 to 36 in different subjects. Some of the cases

were purely one-sided, others were affected in both lungs, and a third type belonged to the cases with some intercurrent disease, *e. g.*, syphilis, filariasis, diabetes etc. Thus in 18 cases the disease was purely right-sided ; in 17 purely left-sided ; and in the remaining 15, it was bilateral. They manifested different degrees of toxaemia ranging from 'very marked' to 'moderate'. As regards the results presented by the speaker, these were outlined as follows :

1.	Good ...	...	15—or 30 per cent
2.	Fair ...	...	13—or 26 „ „
3.	Poor ...	...	7—or 14 „ „
4.	Worse	...	7—or 14 „ „
5.	Died ...	...	2—or 4 „ „
6.	Left treatment	...	6—or 12 „ „

Some of the cases had not continued treatment consistently as directed, had allowed long periods to lapse between fills, or had discontinued too soon.

Medical News and Notes

[Items of news and notes of general interest to the profession for incorporation in this section from the members of the profession will be greatly appreciated—EDITOR]

Council of the Medical Education Society of Bengal. The Calcutta Corporation have elected at their meeting on Wednesday, the 30th August, DR. K. S. RAY and DR. J. N. MAITRA to be two of their three Representatives for 1933-34 on the Council of the Medical Education Society governing the affairs of the Carmichael Medical College and hospitals.

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Carmichael Medical College. Messrs. B. B. GUPTA and I. B. GUPTA have donated Rs. 50,000 for a radium annexe to be attached to the Carmichael Medical College Hospital. The annexe is to be named as "NALINI GUPTA Radium Annexe" in memory of the late MR. N. GUPTA, C.I.E., Bar-at-Law, of Barisal, the brother of the donors.

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Hospital Accommodation in Calcutta. Calcutta Rotarians adopted a resolution urging the appointment of a Committee to enquire into the hospital accommodation in Calcutta and to suggest ways and means for better accommodation. DR. BIDHAN CHANDRA ROY, speaking on the resolution, said that the underlying idea was not that they should necessarily increase the provincial expenditure in this respect, but that efforts should be made to enquire into the cost of the administration of certain hospitals in the city.

* * * * *

Calcutta-made Substitute for Quinine. It is understood that Prof. H. K. SEN and Professor UMAPRASANNA BASU of the University College of Science, Calcutta, have synthesised a new compound in their college laboratory, which would replace quinine. In an interview with the Associated Press Representative, the Professors hinted that this new reduced isoquinoline derivative. has been pharmacologically tested, and has been found to be a salubrious substitute for quinine. Its toxicity is less than that of quinine but its bactericidal property is nearly equal. It is free from the side effects of quinine, and hence promises to be an excellent substitute as an antipyretic and also as an anti-parasitic. As an ammonium salt, it is moderately soluble in water, but considerably less bitter in taste than quinine. As the starting materials for the synthesis of this compound are cheap, both DR. SEN and Prof. BASU think that its commercial possibilities are not to be doubted. The value of such a synthesis can be appreciated, they say, when one takes into consideration that no elaborate plantation or heavy investments, which are necessary in producing quinine, are required in this case. As a matter of fact, it is synthesised from coal or tar derivatives and a derivative of acetic acid, all of which are already commercially available in the market. The chemical name of the new synthetic drug is ammonium salt of 3 Keto 4 cyano 1 hydroxy : 2:3:5:6:7:8 hexahydro-isoquinoline.

* * * * *

Veterinarians and Public Health. Presiding over the annual meeting of the Madras Veterinary College Medical Association on July 29th, MR. T. J. HURLEY, Director of Veterinary Services, Madras, remarked that at the present time in India, the veterinarian was not called upon to help in public health matters and the chief reason for that was, the present problems confronting public health workers such as the suppression of plague, cholera, small-pox etc., are so important and urgent that the comparatively less urgent problems that veterinarians might help in, had been overlooked. A great deal of work in public health matters in which the veterinarians could help was in connection with food supply, namely meat and milk, and it was necessary that the standard of living must be raised in India and the public educated to demand a clearer and better food supply. But the time was not far distant when there would

be a special veterinary staff working in co-operation with the public health staff to control the various diseases communicable from animals to men.

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Common Medical Register for C. P. and Berar. The C. P. Government with the provincial approval of the Governor-General-in-Council has modified the Central Provinces Medical Registration Act of 1916 in its application to Berar.

So far, the present Act, as it stood, could not be applied to Berar because the result would have been the establishment of separate medical councils for the Central Provinces and for Berar. The Act is now so amended as to have constitution of a common medical council and the maintenance of a common register of medical practitioners in the two provinces.

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Subsidising Drug Research. According to Weekly Druggist, Tokyo, there is a movement in Japan to cut down the cost of imported medicines now amounting to about 20 million yens (roughly Rupees twenty five millions) by ten percent, in the first stage of the proposed plan, by giving Government subsidies to researches to be under taken into the manufacturing of medicines now imported.

Another object of the proposal is to lower the cost of medical treatment. The subsidies are to be given at the recommendation of the Pharmaceutical Promotion Commission. On December 14th, the list of medicines on which investigation should be made was announced.

Special efforts will be made to investigate the cultivation of santonin, which is now being imported from Soviet Russia to the amount of 3,000,000 yen per year, and quinine. It is also contemplated to revise the tariff on imported drugs, some of the important medicines coming under this head are bromine, bromic acid, carbolic acid, phenyl, salicylate, antipyrine, pyramidon, antifebrine, formaline, acetic acid, acetic anhydride and aspirin.

* * * * *

The Fight against Cancer. An International Congress for the Scientific and Social Fight against cancer is to be held in Madrid from October 25 to 30. The attendance of experts from all parts of the world including much distant countries as Australia, Japan and New Zealand is expected.

The proceedings will be divided into two chief sections scientific and social, the former being concerned with the biology of the cancerous cell, the diagnosing of cancer in the early stages, treatment of the disease and tumours of the nervous system; while the social side will deal with industrial and professional cancer, insurance and legislation, statistics, organisation of anti-cancer methods, and the education of the public against cancer. There will also be a series of lectures on the latest developments regarding the disease.

A daily bulletin will be published giving all the news and proceedings and programmes of events; French, English, Italian, Spanish and German being the languages chosen for the programmes.

* * * * *

All-Women Hospital in London. The South London Hospital for Women is one of the few hospitals anywhere staffed entirely by women, both on the medical and administrative sides. Boys are taken up to six years old, but otherwise, all the patients are women. The only men employed are the engineers, the stokers and the porters.

The hospital owes its origin to a group of medical women, who found that it was very difficult for women doctors to become fully trained; they could qualify but they could not get the necessary clinical practice afterwards on a hospital staff and therefore decided to found a hospital of their own. In spite of much anti-feminist feeling being aroused, funds were raised and the hospital was founded in 1912. From an unpretentious organisation with the income of £ 453/- in 1913, it is now a powerful institution with an annual income in the neighbourhood of £28,003/- and with legitimate pride Miss. M. C. Ridley, its Hony. Secretary,—recently remarked to a press representative that women doctors and surgeons have proved equal to every emergency, "and since the start, it has never been necessary to consult a male specialist, who in fact under the conditions of the foundations, cannot be called in."

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America's Surplus Doctors. According to a report of the American Medical Association's Council on Medical Education, there is a surplus of 25,000 physicians in the United States of America.

The over-production is said to be due to too many admissions in the various medical schools in the United States. The Council urges that medical schools should limit their enrolment severely in view of this situation. It further recommends that American graduates of foreign medical schools be barred from state examinations in this country unless they fulfilled American premedical requirements before going abroad and could show that they passed a licensing examination in the country where they studied.

Indian Medical Council Act

Act No. XXVII of 1933

[The following Act of the Indian Legislature received the assent of the Governor General on the 23rd September, 1933. —Ed.]

WHEREAS it is expedient to constitute a Medical Council in India in order to establish a uniform minimum standard of higher qualifications in medicine for all provinces; It is hereby enacted as follows :—

Short title, extent and commencement.

1. (1) This Act may be called the Indian Medical Council Act, 1933.

(2) It extends to the whole of British India.

(3) It shall come into force on such date as the Governor General in Council may, by notification in the Gazette of India, appoint.

Definitions.

2. In this Act, unless there is anything repugnant in the subject or context,—

(*a*) "British Indian University" means any university in British India established by an Act of the Indian Legislature or of a local Legislature and having a medical faculty ;
(*b*) "the Council" means the Medical Council of India constituted under this Act ;
(*c*) "medical institution" means any institution within or without British India, which grants degrees, diplomas or licences in medicine ;
(*d*) "medicine" means modern scientific medicine and includes surgery and obstetrics, but does not include veterinary medicine and surgery ;
(*e*) "Provincial Medical Council" means a medical council constituted under an Act of a local Legislature to regulate the registration of medical practitioners ;
(*f*) "Provincial Medical Register" means a register maintained under an Act of a local Legislature to regulate the registration of medical practitioners ;
(*g*) "recognised medical qualification" means any of the medical qualifications included in the First and Second Schedules ; and
(*h*) "Regulation" means a Regulation made under section 18.

Constitution and composition of the Council.

3. (1) The Governor General in Council shall cause to be constituted a Council consisting of the following members, namely :—

(*a*) one member from each Governor's province, to be nominated by the Local Government of the province ;
(*b*) one member from each British Indian University, to be elected by the members of the Senate of the University (or, in the case of the University of Lucknow, the Court, and in the case of the University of Rangoon, the Council) from amongst the members of the medical faculty of the university ;
(*c*) one member from each province where a Provincial Medical Register is maintained, to be elected from amongst themselves by persons enrolled on the Register, who possess recognised medical qualifications or medical qualifications granted by a British Indian University ; and
(*d*) three members to be nominated by the Governor General in Council.

(2) The President of the Council shall be elected by the members of the Council from amongst themselves :

Provided that for four years from the first constitution of the Council the President shall be a person nominated by the Governor General in Council who shall hold office during the pleasure of the Governor General in Council and, where he is not already a member, shall be a member of the Council in addition to the members prescribed in sub-section (*1*).

(3) No act done by the Council shall be questioned on the ground merely of the existence of any vacancy in, or any defect in the constitution of, the Council.

Mode of election.

4. (1) An election under clause (*b*) *or* clause (*c*) of sub-section (*1*) of section 3 shall be conducted by the Local Government, in such manner as it may think fit, subject to any instructions the Governor-General in Council may issue in this behalf.

(2) Where any dispute arises regarding any election to the Council, it shall be referred to the Local Government whose decision shall be final.

Restrictions of nominations and elections.

5. (1) No person shall be eligible for nomination or election under clause (*a*) or (*b*) of sub-section (*1*) of section 3 unless he possesses a recognised medical qualification or a medical qualification granted by a British Indian University.

(2) No person shall be eligible for nomination under clause (*a*) of sub-section (*1*) of section 3 unless he resides in the province concerned, and, where a Provincial Medical Register is maintained in that province unless he is enrolled on that register.

(3) No person shall be eligible for election under clause (*b*) of sub-section (*1*) of section 3 unless he has had at least four years' experience as a Professor, Assistant Professor, Lecturer or Reader in Medical Colleges or Schools.

(4) No person may at the same time serve as a member in more than one capacity.

Incorporation of the Council.

6. The council so constituted shall be a body corporate by the name of the Medical Council of India, having perpetual succession and a common seal, with power to acquire and hold property both movable and immovable, and to contract, and shall by the said name sue and be sued.

Term of office.

7. (1) An elected President shall hold office for a term not exceeding five years and not extending beyond the expiry of the term for which he has been nominated or elected to be a member of the Council.

(2) A member, other than a nominated President, shall hold office for the term of five years from the date of his nomination or election or until his successor shall have been duly nominated or elected, whichever is longer.

(3) Where the said term of five years is about to expire in respect of any member, his successor may be nominated or elected at any time within three months before the said term expires, but shall not assume office until the said term has expired.

Meetings of the Council.

8. (1) The Council shall hold its first meeting at such time and place as may be appointed by the Governor General in Council; and thereafter the Council shall meet at least once in each year at such time and place as may be appointed by the Council.

(2) Until otherwise provided by Regulations, ten members of the Council shall form a quorum, and all the acts of the Council shall be decided by a majority of the members present and voting.

Officers, Committees and servants of the Council.

9. (1) The Council shall—

(*a*) elect from amongst its members a Vice-President;

(*b*) constitute from amongst its members an Executive Committee, and such other Committees for general or special purposes as the Council deems necessary to carry out the purposes of this Act;

(*c*) appoint a Secretary, who may also, if deemed expedient, act as Treasurer;

(*d*) appoint or nominate such other officers and servants as the Council deems necessary to carry out the purposes of this Act;

(*e*) require and take from the Secretary, or from any other officer or servant, such security for the due performance of his duties as the Council deems necessary; and

(*f*) with the previous sanction of the Governor General in Council, fix the remuneration and allowances to be paid to the President, Vice-President, members, officers and servants of the Council.

(2) Notwithstanding anything contained in clause (*c*) of sub-section (1), for the four years from the commencement of this Act, the Secretary of tho Council shall be a person appointed by the Governor General in Council, who shall hold office during the pleasure of the Governor General in Council.

The Executive Committee.

10. (1) The Executive Committee shall consist of seven members, of whom five shall be elected by the Council from amongst its members.

(2) The President and Vice-President of the Council shall be members ex officio of the Executive Committee, and shall be President and Vice-President, respectively, of that Committee.

(3) In addition to the powers and duties conferred and imposed upon it by this Act, the Executive Committee shall exercise and discharge such powers and duties as the Council may confer or impose upon it by any Regulations which may be made in this behalf.

Recognition of medical qualifications granted by medical institutions of British India.

11. (1) The medical qualifications granted by medical institutions in British India which are included in the First Schedule shall be recognised medical qualifications for the purposes of this Act.

(2) Any medical institution in British India which grants a medical qulification not included in the First Schedule may apply to the Governor General in Council to have such qualification recognised, and the Governor General in Council, after consulting the Council, may, by notification in the Gazette of India, amend the First Schedule so as to include such qulification therein.

(3) Such notification may also direct that an entry shall be made in the last column of the First Schedule against such medical qualification declaring that it shall be a recognised medical qulification only when granted after a specified date.

(4) The Council shall, as soon as may be and without application being made, make all necessary arrangements for the inspection of the medical courses and examinations of the Universities of Patna, Rangoon and Andhra, and shall submit their recommendations to the Governor General in Council regarding the inclusion in the First Schedule of the medical qualifications granted by these Universities.

Non-Indian qulifications in Second Schedule to be recognised.

12. The medical qualifications granted by medical institutions outside British India which are included in the Second Schedule shall be recognised medical qualifications for the purposes of this Act, and shall be sufficient qualification for enrolment on any Provincial Medical Register.

Transitory arrangements for modifying the Second Schedule.

13. (1) At any time during the period of four years after the commencement of this Act, the Council may enter into negotiations with the authority in any State or country outside British India which is entrusted by the law of such State or country with the maintenance of a register of medical practitioners, for the settling of a scheme of reciprocity for the recognition of medical qualifications, and the course of such negotiations shall be reported to the Governor General in Council, along with the decisions of the Council to recognise or to refuse to recognise the medical qualifications proposed by such authority for recognition in British India.

(2) In so far as the decisions of the Council to recognise medical qualifications are accepted by the Governor General in Council, they shall be embodied in a resolution and published in the Gazette of India, and such resolution shall specify or indicate with sufficient accuracy all medical qualifications finally approved for recognition in British India :

Provided that where any such resolution specifies or indicates a medical qualification which is not included in the Second Schedule, the Governor General in Couneil may, by notification in the Gazette of India, amend the Second Schedule so as to include such qualification therein, and such amendment may further direct that such qualification shall be deemed to be a recognised medical qualification for the purposes of this Act only when granted after a specified date.

(3) Within one month before the expiry of the period of four years from the commencement of this Act, the Governor General in Council shall frame a schedule to include all medical qualifications which have been specified or indicated by him in resolutions made under sub-section (2), and shall publish the said schedule in the Gazette of India, and such schedule shall be substituted for the Second Schedule with effect from the expiry of the said period of four years, and shall then have force as if it had been enacted in this Act :

Provided that the Governor General in Council shall include in the said schedule all medical qualifictions included in the Second Schedule which were granted before the expiry of the said period of four years.

Permanent arrangements modifying the Second Schedule.

14. (1) At any time after the expiry of the period of four years after the commencement of this Act, the Council may complete or may enter into negotiations with the authority in any State or country outside British India which by the law of such State or country is entrusted with the maintenance of a register of medical practitioners, for the setting of a scheme of reciprocity for the recognition of medical qualifications, and in pursuance of any such scheme the Governor General in Council may, by notification in the Gazette of India, amend the Second Schedule so as to include therein any medical qualification which the Council has decided should be recognised.

(2) Such notification may also direct that an entry shall be made in the last column of the Second Schedule against such medical qualification declaring that it shall be a recognised medical qualification only when granted after a specified date.

(3) The Governor General in Council, after consultation with the Council, may, by notification in the Gazette of India, amend the Second Schedule by directing that an entry be made therein in respect of any medical qualification, declaring that it shall be a recognised medical qualification only when granted before a specified date.

(4) Where the Council has refused to recognise any medical qualification which has been proposed for recognition by any such authority, that authority may apply to the Governor General in Council, and the Governor General in Council, after considering such application and

after consulting the Council, may, by notification in the Gazette of India, amend the Second Schedule so as to include such qualification therein, and the provisions of sub-section (2) shall apply to such notification.

Power to require information as to courses of study and examinations.

15. Every medical institution in British India which grants a recognised medical qualification shall furnish such information as the Council may, from time to time, require as to the courses of study and examinations to be undergone in order to obtain such qualification, as to the ages at which such courses of study and examinations are required to be undergone and such qualification is conferred, and generally as to the requisites for obtaining such qualification.

Inspection of examinations.

16. (1) The Executive Committee shall appoint such number of medical inspectors as it may deem requisite to attend at any or all of the examinations held by medical institutions in British India for the purpose of granting recognised medical qualifications.

(2) Inspectors appointed under this section shall not interfere with the conduct of any examination, but they shall report to the Executive Committee on the sufficiency of every examination which they attend and on any other matters in regard to which the Executive Committee may require them to report.

(3) The Executive Committee shall forward a copy of any such report to the medical institution concerned, and shall also forward a copy, with the remarks of such institution thereon, to the Governor General in Council.

Withdaawal of recognition.

17. (1) When, upon report by the Executive Committee, it appears to the Council that the courses of study and examination to be gone through in any medical institution in British India in order to obtain a recognised medical qualification or that the standards of proficiency required from candidates at any examination held for the purpose of granting such qualification are not such as to secure to persons holding such qualification the knowledge aud skill requisite for the efficient practice of medicine, the Council shall make a representation to that effect to the Governor General in Council.

(2) After considering such representation, the Governor General in Council may send it to the Local Government of the province in which the medical institution is situated, and the Local Government shall forward it, along with such remarks as it may choose to make, to the medical institution, with an intimation of the period within which the medical institution may submit its explanation to the Local Government.

(3) On the receipt of the explanation or, where no explanation is submitted within the period fixed, then on the expiry of that period, the Local Government shall make its recommendations to the Governor General in Council.

(4) The Governor General in Council, after making such further inquiry, if any, as he may think fit, may, by notification in the Gazette of India, direct that an entry shall be made in the First Schedule against the said medical qualification declaring that it shall be a recognised medical qualification only when granted before a specified date.

Power to make Regulations.

18. (1) The Council may, with the previous sanction of the Governor General in Council, make Regulations generally to carry out the purposes of this Act, and, without prejudice to the generality of this power, such Regulations may provide for—

(*a*) the management of the property of the Council ;
(*b*) the summoning and holding of meetings of the Council, the times and places where such meetings are to be held, the conduct of business thereat and the number of members necessary to constitute a quorum ;
(*c*) the resignation of members of the Board and the filling of casual vacancies ;
(*d*) the powers and duties of the President and Vice-President ;
(*e*) the mode of appointment of the Executive Committee and other Committees, the summoning and holding of meetings, and the conduct of business of such Committees.
(*f*) the tenure of office, and the powers and duties of the Secretary and other officers and servants of the Council ;
(*g*) the appointment, powers, duties and procedure of medical inspectors ; and
(*h*) any matter for which under this Act provision may be made by Regulations.

(2) Until the first Council is constituted under this Act, any Regulations which may be under sub-section (1) may be made by the Governor General in Council ; and any Regulation so made may be altered or rescinded by the Council in exercise of its powers under sub-section (1).

Information to be furnished by Council, and publication thereof.

19. (1) The Council shall furnish such reports, copies of its minutes, abstracts of its accounts, and other information to the Governor General in Council as he may require.

(2) The Governor General in Council may publish, in such manner as he may think fit, any report, copy, abstract or other information furnished to him under this section or under section 16.

Commissions of Inquiry

20. (1) Whenever it is made to appear to the Governor General in Council that the Council is not complying with any of the provisions of this Act, the Governor General in Council may refer the particulars of the complaint to a Commission of Inquiry consisting of three persons, two of whom shall be appointed by the Governor General in council, one being a Judge of a High Court established by LettersPatent of the Crown, and one by the Council; and such Commission shall proceed to inquire in a summary manner and to report to the Governor General in Council as to the truth of the matters charged in the complaint, and in case of any charge of default or of improper action being found by the Commission to have been established, the Commission shall recommend the remedies, if any, which are in its opinion necessary.

(2) The Governor General in Council may require the Council to adopt the remedies so recommended within such time as, having regard to the report of the Commission, he may think fit; and if the Council fails to comply with any such requirement, the Governor General in Council may amend the Regulations of the Council, or make such provision or order or take such other steps as may seem necessary to give effect to the recommendations of the Commission.

(3) A Commission of Inqniry shall have power to administer oaths, to enforce the attendance of witnesses and the production of documents, and shall have all such other necessary powers for the purpose of any inquiry conducted by it as are exercised by a Civil Court under the Code of Civil Procedure, 1908.

THE FIRST SCHEDULE. (*See* section 11).

Recognised medical qualifications granted by medical institutions in British India.

Medical Institution.	Recognised medical qualification.	Abbreviation for registration.
University of Allahabad	Bachelor of Medicine and Bachelor of Surgery	M.B., B.S., All
University of Bombay ...	Licentiate in Medicine and Surgery ...	L.M.S., Bom.
	Bachelor of Medicine and Bachelor of Surgery	M.B., B.S., Bom.
	Doctor of Medicine	M.D., Bom.
	Master of Surgery	M.S., Bom.
University of Calcutta ...	Licentiate in Medicine and Surgery ...	L.M.S., Cal.
	Bachelor of Medicine	M.B., Cal.
	Doctor of Medicine	M.D., Cal.
	Master of Surgery	M.S., Cal.
	Master of Obstetrics	M.O., Cal.
University of Lucknow ...	Bachelor of Medicine and Bachelor of Surgery	M.B., B.S., Lucknow.
University of Madras ...	Licentiate in Medicine and Surgery ...	L.M.S., Mad.
	Bachelor of Medicine and Master of Surgery	M.B , C.M., Mad.
	Bachelor of Medicine and Bachelor of Surgery	M.B., B.S., Mad.
	Doctor of Medicine	M.D., Mad.
Punjab University ...	Licentiate in Medicine and Surgery ...	L.M.S., Pun.
	Bachelor of Medicine	M.B., Pun.
	Doctor of Medicine	M.D., Pun.
	Master of Surgery	M.S., Pun.

THE SECOND SCHEDULE. (*See* section 12).

Recognised medical qualifications granted by medical institutions outside British India.

A. Registrable qualifications admitting primarily to the Medical Register granted by licensing bodies in the United Kingdom, as shown in Table (F) set out in the Medical Register for 1931 printed and published under the direction of the General Council of Medical Education and Registration of the United Kingdom in pursuance of the Medical Acts, 1858 and 1886.

B. Registrable qualifications granted by licensing bodies in British possessions, as shown in Table (I) set out in the said Medical Register, other than registrable qualifications granted by licensing bodies in India.

C. Registrable qualifications granted by licensing bodies in Foreign Countries, as shown in Table (J) set out in the said Medical Register.

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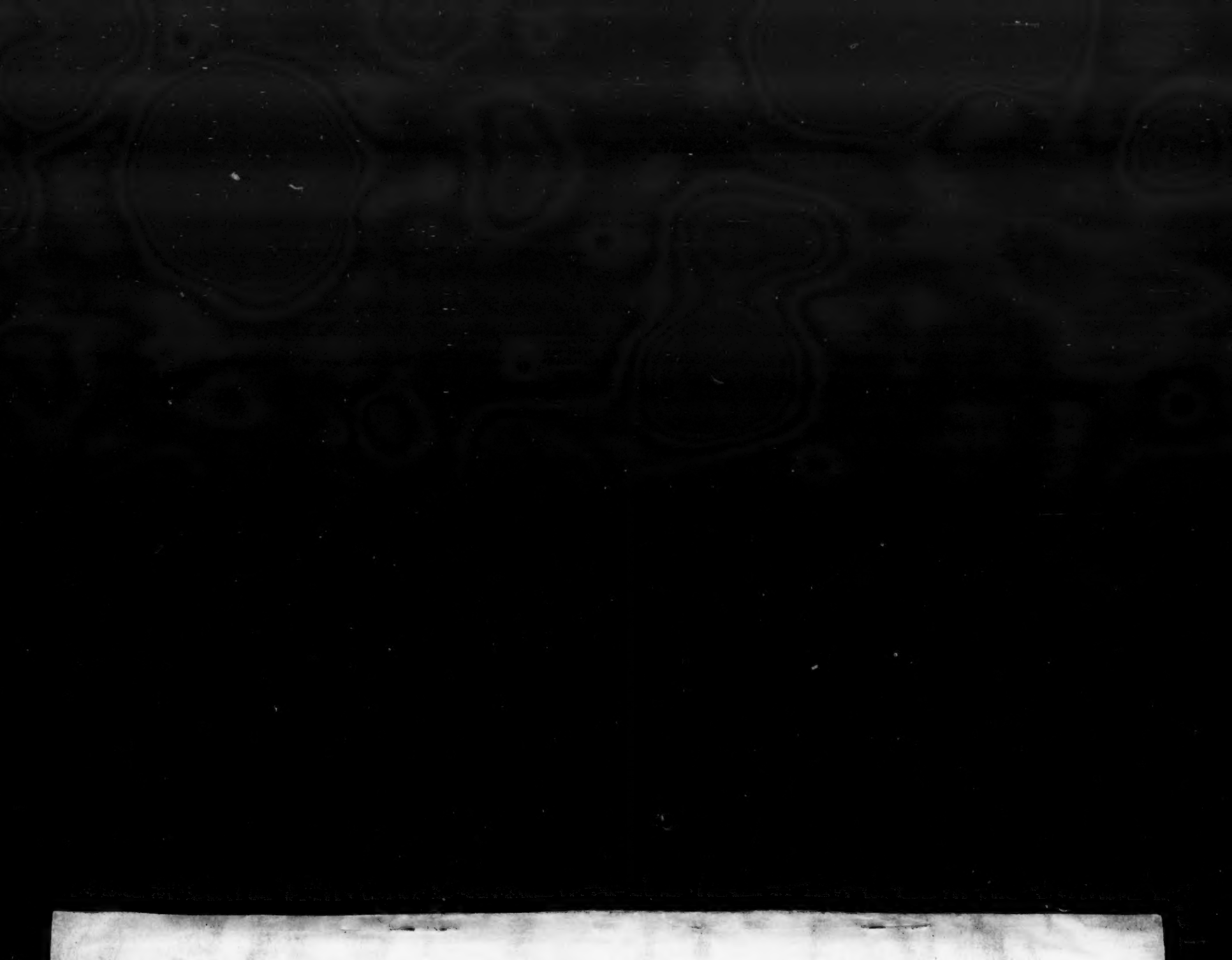
Printed at The Indian Press Ltd., 93, Dhurrumtolla Street, and Published from 67, Dhurrumtolla Street, Calcutta by Dr. Aghorenath Ghosh, M.B.